WRDC-TR-90-0001

WRIGHT RESEARCH AND DEVELOPMENT CENTER

TEST FACILITIES HANDBOOK

JANUARY 1990

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This technical report has been reviewed and is approved for publication.

Margaret B. Skujins

Margaret B. Skujins
Test Engineer
WRDC/TE

FOR THE COMMANDER

Michael R. Maleske

MICHAEL R. MALESKE
Lt Col, USAF
Chief of Staff

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This handbook contains a listing of Wright Research and Development Center facilities located at Wright-Patterson AFB OH. Facilities included are those of the Materials, Aero Propulsion and Power, Avionics, Flight Dynamics, and Electronic Technology laboratories and the Signature Technology, Technology Exploitation, and Cockpit Integration directorates. Documented listings include information on facility type, capabilities, instrumentation, availability and POC.

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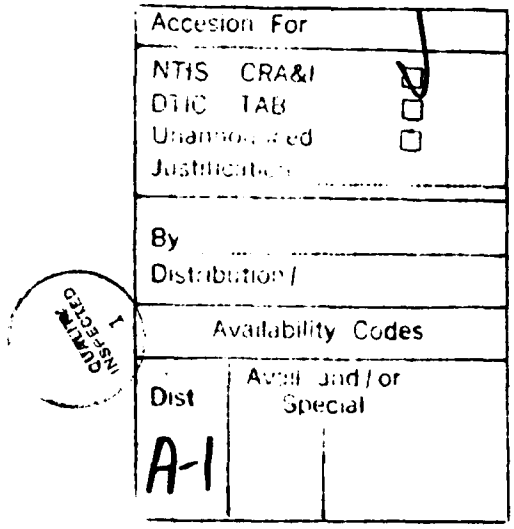


INTRODUCTION

The Wright Research and Development Center (WRDC) Facilities Handbook is organized as a quick reference guide to facility capabilities available in the Center.

WRDC is divided into five laboratories (Aero Propulsion and Power, Avionics, Electronic Technology, Flight Dynamics, and Materials) and four directorates (Cockpit Integration, Manufacturing Technology, Signature Technology, and Technology Exploitation) with staff support functions. Through a unique mixture of broadbased laboratories and more focused directorates, WRDC plans and executes basic research, exploratory and advanced development, selected engineering development and Air Force manufacturing technology programs in a multitude of technology areas. Although its major mission is to develop and expand the technology base, WRDC is also responsible for providing technical expertise and assistance throughout the Air Force to support the acquisition of new systems and the resolution of development and operational problems.

The WRDC Facilities Handbook consists of a brief functional overview of the laboratories and directorates, a summary of each facility, a facility name index, and a keyword index.

FUNCTIONAL OVERVIEWS-LABORATORIES

AVIONICS LABORATORY-Conducts research and development programs for reconnaissance, weapons delivery, and electronic warfare systems. Oversees the Air Force Very High-Speed Integrated Circuit (VHSIC) Program.

DIVISIONS:	System Avionics	(AAA)
	Mission Avionics	(AAR)
	Electronic Warfare	(AAW)

ELECTRONIC TECHNOLOGY LABORATORY-Responsible for electronic device research and development for future Air Force systems needs in the areas of microelectronics, microwaves and electro-optics.

DIVISIONS:	Microelectronics	(ELE)
	Microwave	(ELM)
	Electro-Optics	(ELO)
	Research	(ELR)

FLIGHT DYNAMICS LABORATORY-Pursues Air Force flight vehicle technologies to support aircraft, missiles and space systems in the technical areas of structures, vehicle subsystems, flight control, aeromechanics and experimental flight vehicle testbeds.

DIVISIONS:	Structures	(FIB)
	Vehicle Subsystems	(FIV)
	Flight Control	(FIG)
	Aeromechanics	(FIM)

MATERIALS LABORATORY-Explores new materials and processes for advanced aerospace applications. Current focus on thermal protection materials, metallic and nonmetallic structural materials, aerospace propulsion materials, fluids and lubricants, electromagnetic and electronic materials and laser hardened materials.

DIVISIONS:	Nonmetallic Materials	(MLB)
	Metals and Ceramics	(MLL)
	Electromagnetic Materials and Survivability	(MLP)

AERO PROPULSION AND POWER LABORATORY-Develops the airbreathing propulsion and aerospace power technology needed for future Air Force systems, assists the "product" divisions of Air Force Systems Command in acquiring new systems, and helps resolve developmental and operational problems.

DIVISIONS:	Aerospace Power	(POO)
	Advanced Propulsion	(POP)
	Fuels and Lubrication	(POS)
	Turbine Engine	(POT)

FUNCTIONAL OVERVIEWS-DIRECTORATES

COCKPIT INTEGRATION DIRECTORATE Performs research to advance the state of the art of crew systems technologies for all classes of aerospace vehicles. Manages advanced development programs addressing crew station design and cockpit control integration with emphasis on information.

DIVISIONS:	Crew Aiding Technology	(KTA)
	Crew Systems Concepts	(KTC)
	Crew Systems Development	(KTD)
	Crew Systems Test and Evaluation	(KTE)

SIGNATURE TECHNOLOGY DIRECTORATE-Plans, formulates, and executes USAF exploratory and advanced development programs for vehicle signature reduction technology and counter low observable technology.

DIVISIONS:	Defense Avionics	(SNA)
	Aero Propulsion and Configuration	(SNP)
	Structures and Materials	(SNS)
	Technology Demonstration	(SNT)

TECHNOLOGY EXPLOITATION DIRECTORATE-WRDC's vehicle for achieving a key objective of focusing on improved integration of its technologies to provide improved weapon system capabilities in terms of performance, reliability, maintainability, and cost.

DIVISIONS:	Technology Assessment	(TXA)
	Advanced Development	(TXD)
	Hypersonic Vehicle Technology	(TXH)
	Integrated Logistics Technology	(TXL)
	Technology Transition	(TXT)
	Space Applications Technology	(TXX)

MANUFACTURING TECHNOLOGY DIRECTORATE-Serves as the focal point for planning and executing an integrated manufacturing program across WRDC. Contains no test facilities.

DIVISIONS:	Concurrent Engineering	(MTC)
	Electronics	(MTE)
	Integration Technology	(MTI)
	Processing and Fabrication	(MTP)


AERO PROPULSION & POWER LABORATORY

FACILITY TYPE:

Propeller Test

PURPOSE:

Performance, endurance, and validation testing of propellers and other test articles

FACILITY NAME:

Propeller Test Facility

PRIMARY CAPABILITIES:

Whirl Rig #1:hp-10,000; thrust(lb)-60,000; max test article diameter(ft)-44; RPM-7,200

Whirl Rig #2:hp-3,500; thrust(lbs)-40,000; max test article diameter(ft)-44; RPM-9,000

Whirl Rig #3:hp-2,500; thrust(lbs)-20,000; max test article diameter(ft)-44

SPECIAL/UNIQUE CAPABILITIES:

Electrically driven

High horsepower drives

Wide speed range with precise speed control

INSTRUMENTATION:

Monitor rotational speed, power, thrust,vibration and bearing temperatures

AVAILABILITY:

Available to U.S. government agencies

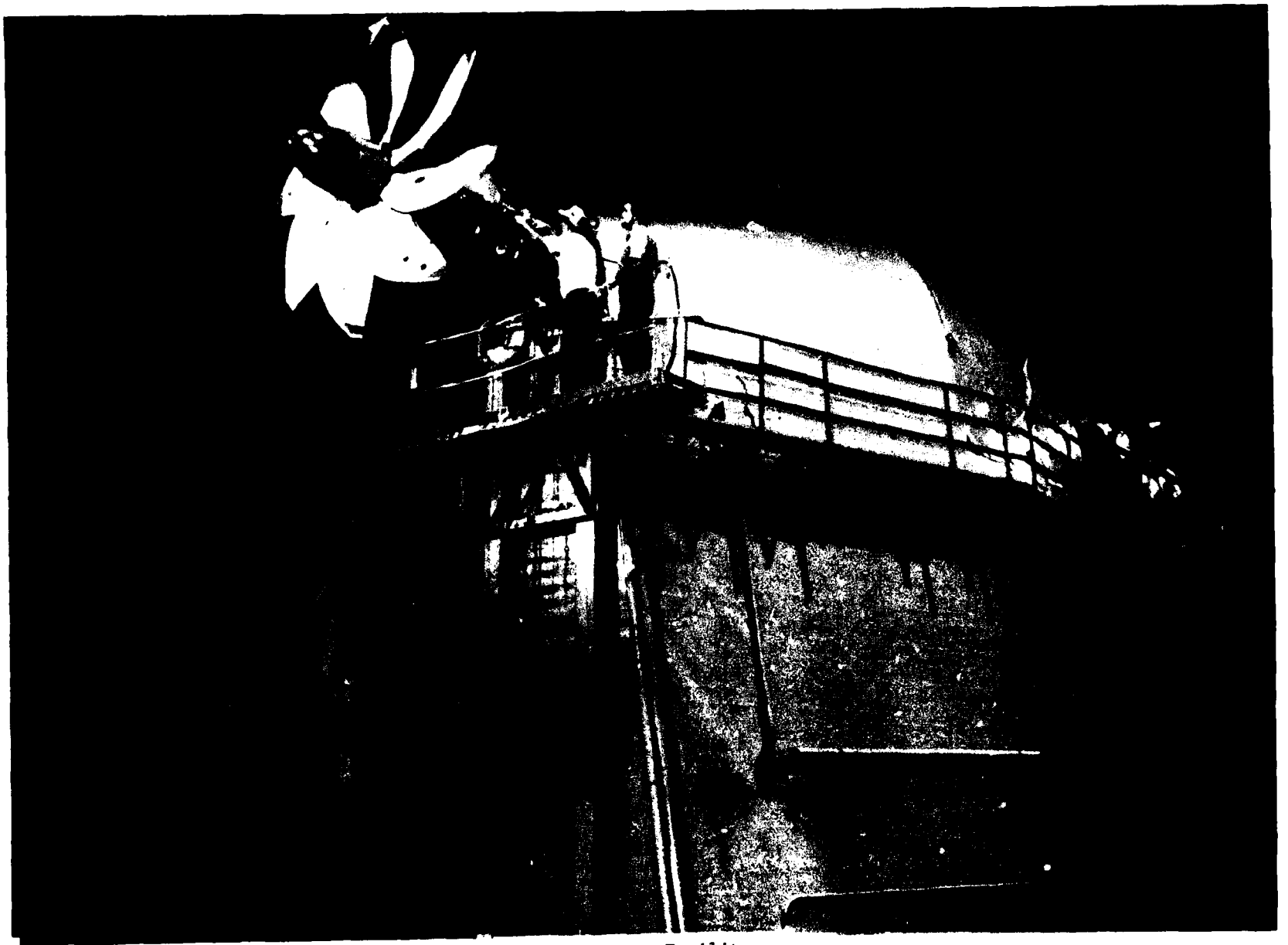
Available to government agency sponsored contractors

LOCATION:

BUILDING: 20A ROOM:

POINT OF CONTACT:

WRDC/POMF
WPAFB, OH 45433-6563
(513) 255-4013
AV 785-4013



Propeller Test Facility

FACILITY TYPE:
Helicopter Rotor Test

PURPOSE:
Performance, endurance and validation testing of helicopter rotors

FACILITY NAME:
Helicopter Rotor Test Facility

PRIMARY CAPABILITIES:
Electrically driven whirl test stand

Horsepower-6,000;lift-50,000 lbs;maximum rotor diameter(ft)-94; RPM-625

SPECIAL/UNIQUE CAPABILITIES:
Only large government owned rotor test facility on stand-by status

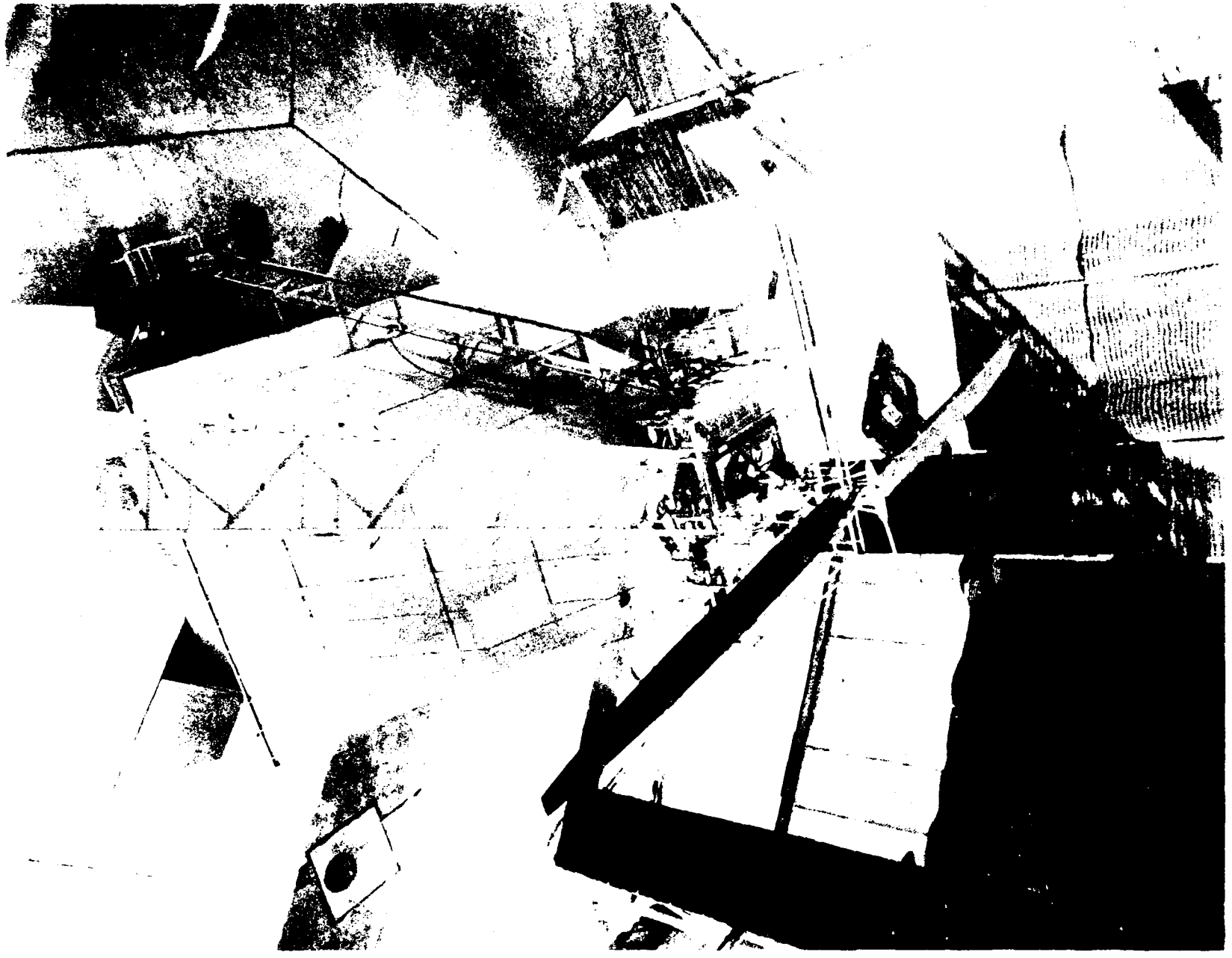
Precise speed control possible

INSTRUMENTATION:
Monitor rotational speed, power,lift and several other equipment related parameters

AVAILABILITY:
On stand-by for support of government agency sponsored tests

LOCATION:
BUILDING: 250 ROOM:

POINT OF CONTACT:
WRDC/POMF
WPAFB, OH 45433-6563
(513) 255-4013
AV 785-4013



FACILITY TYPE:

Airbreathing Propulsion System

PURPOSE:

Provides simulated flight conditions for research cells in the turbine engine, advanced propulsion and fuel technology areas

FACILITY NAME:

Component Research Air Facility

PRIMARY CAPABILITIES:

Compressed air available: 31 lbs/sec(pps) at 50 psia, ambient temperature; 7.5 pps at 315 psia, ambient temperature to 1200 deg F

32 pps at 750 psia, from ambient to 1200 deg F

Altitude simulation from sea level to 60,000 ft at various flow rates

SPECIAL/UNIQUE CAPABILITIES:

Clean, heated air with altitude simulation for small to moderate scale component research

INSTRUMENTATION:

Monitor pressure, temperature, flow and vibration

Central control room

AVAILABILITY:

Not a stand alone facility

Used in conjunction with PO test cells

LOCATION:

BUILDING: 18B ROOM:

POINT OF CONTACT:

WRDC/POMF
WPAFB, OH 45433-6563
(513) 255-4013
AV 785-4013

Component Research Air Facility

FACILITY TYPE:
Aircraft Electrical Power Systems

PURPOSE:
Evaluate state-of-the-art power generation, conversion, and motor drive equipment for aircraft applications

FACILITY NAME:
Aircraft Electrical Power Laboratory

PRIMARY CAPABILITIES:
Test electrical components and systems from high speed power devices to several hundred kilowatt aircraft power systems

SPECIAL/UNIQUE CAPABILITIES:
Three computer controlled 350 hp drive stands

INSTRUMENTATION:
CAMAC based data acquisition on MicroVAX II GPX

Data acquisition and analysis capability

On wave forms up to 100MHZ

AVAILABILITY:
Available to U.S. Government agencies

LOCATION:
BUILDING: 18B ROOM: 13,15

POINT OF CONTACT:
WRDC/POOC
WPAFB, OH 45433-6563
(513) 255-6235
AV 785-6235

Aircraft Electrical Power Laboratory

FACILITY TYPE:

Thermionic Energy Conversion

PURPOSE:

Conduct research on thermionic energy conversion devices for electrical power generation

FACILITY NAME:

Thermionics Laboratory

PRIMARY CAPABILITIES:

Basic and applied research on high temperature thermionic emission through diodes using refractory materials for electrodes

Diagnostic life testing capabilities for future diodes

SPECIAL/UNIQUE CAPABILITIES:

Liquid metal processing for thermionic diodes

Fully equipped diode test stations with alternating current sweep biasing

INSTRUMENTATION:

High speed data acquisition

High efficiency electron bombardment heating; accurate high temperature measurement

IBM-PC/AT compatible data processing

AVAILABILITY:

In-house research

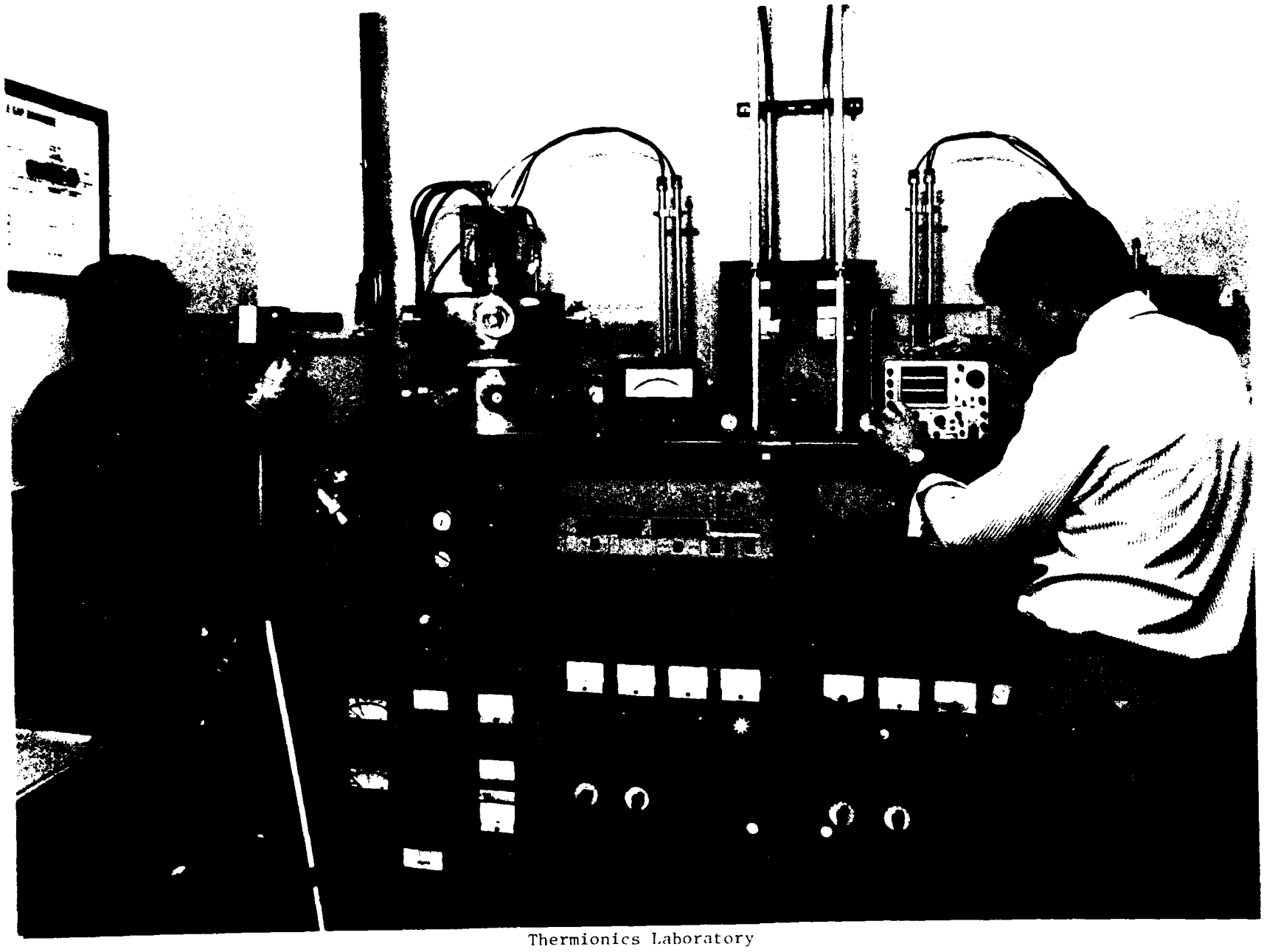
Limited use by government agencies and government contractors

LOCATION:

BUILDING: 18 ROOM: 16

POINT OF CONTACT:

WRDC/POOC
WPAFB, OH 45433-6563
(513) 255-6235
AV 785-6235



Thermionics Laboratory

FACILITY TYPE:
Solar Cell Test and Evaluation

PURPOSE:
Assemble and evaluate experimental solar cells and array segments

FACILITY NAME:
Photovoltaic Research Laboratory

PRIMARY CAPABILITIES:
Electrical and spectral performance measurement

Contact evaluation

Module assembly and test

Space charging/interactions modeling

SPECIAL/UNIQUE CAPABILITIES:
Vacuum chambers for thermal cycling and ultraviolet radiation testing

Fully equipped Class 100 clean room for high temperature metallization research

INSTRUMENTATION:
Spectrosun X25 solar simulator; One/AMO/SUN and 30-50X concentrator simulators

Ultrasonic cleaner; welder and pull tester

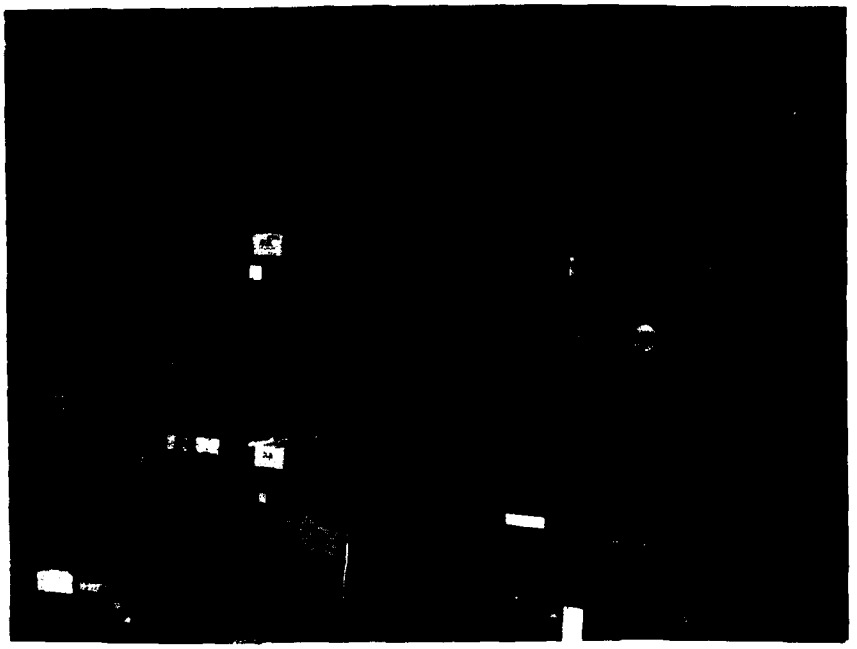
Spectral radiometer; mini VAX

AVAILABILITY:
In-house research

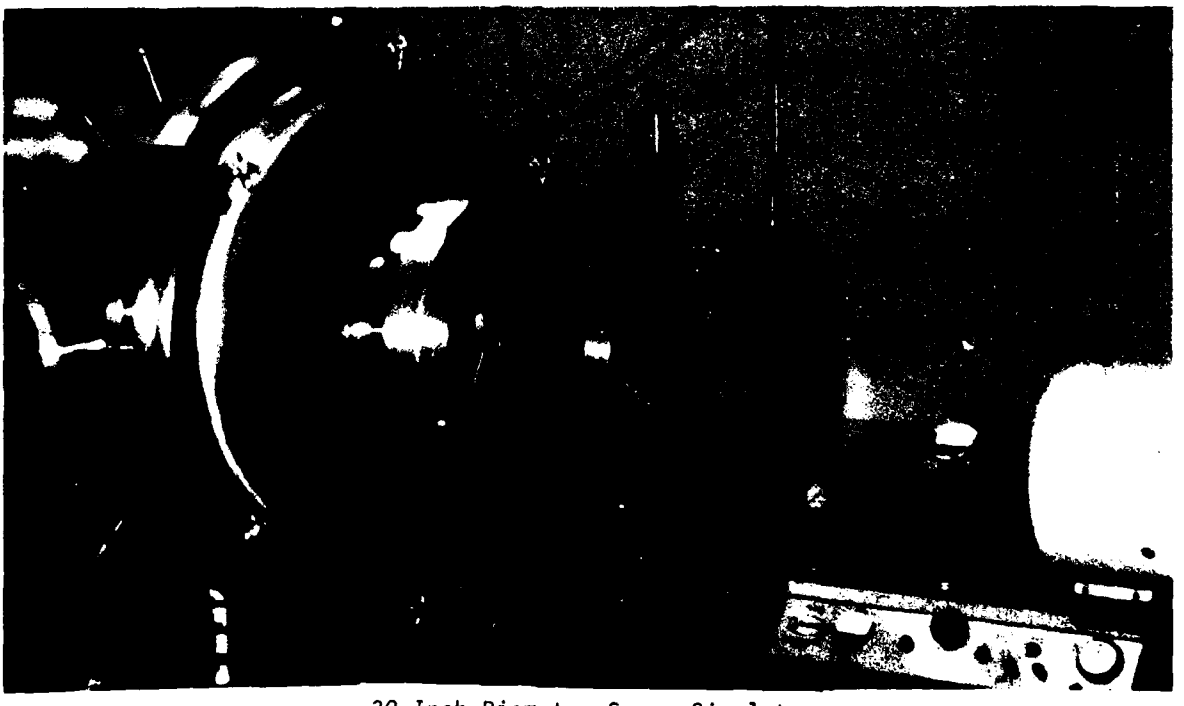
Limited availability to US Government agencies and their contractors

LOCATION:
BUILDING: 18 ROOM: 35G

POINT OF CONTACT:
WRDC/POOC
WPAFB, OH 45433-6563
(513) 255-6235
AV 785-6235



Mark II Solar Simulator



30 Inch Diameter Space Simulator

Photovoltaic Research Laboratory

FACILITY TYPE:
Plasma Physics

PURPOSE:
Experimental and theoretical research on low energy plasmas

FACILITY NAME:
Plasma Physics Laboratory

PRIMARY CAPABILITIES:
Plasma investigations for lasers, high power switches and thin film processing

SPECIAL/UNIQUE CAPABILITIES:
200 KV electron gun with closed discharge system

Fourier transform infrared spectrometer;Fourier transform mass spectrometer

RF plasma reactor

INSTRUMENTATION:
Many of above devices controlled by microcomputers

AVAILABILITY:
Primarily in-house research

LOCATION:
BUILDING: 450 ROOM: D101

POINT OF CONTACT:
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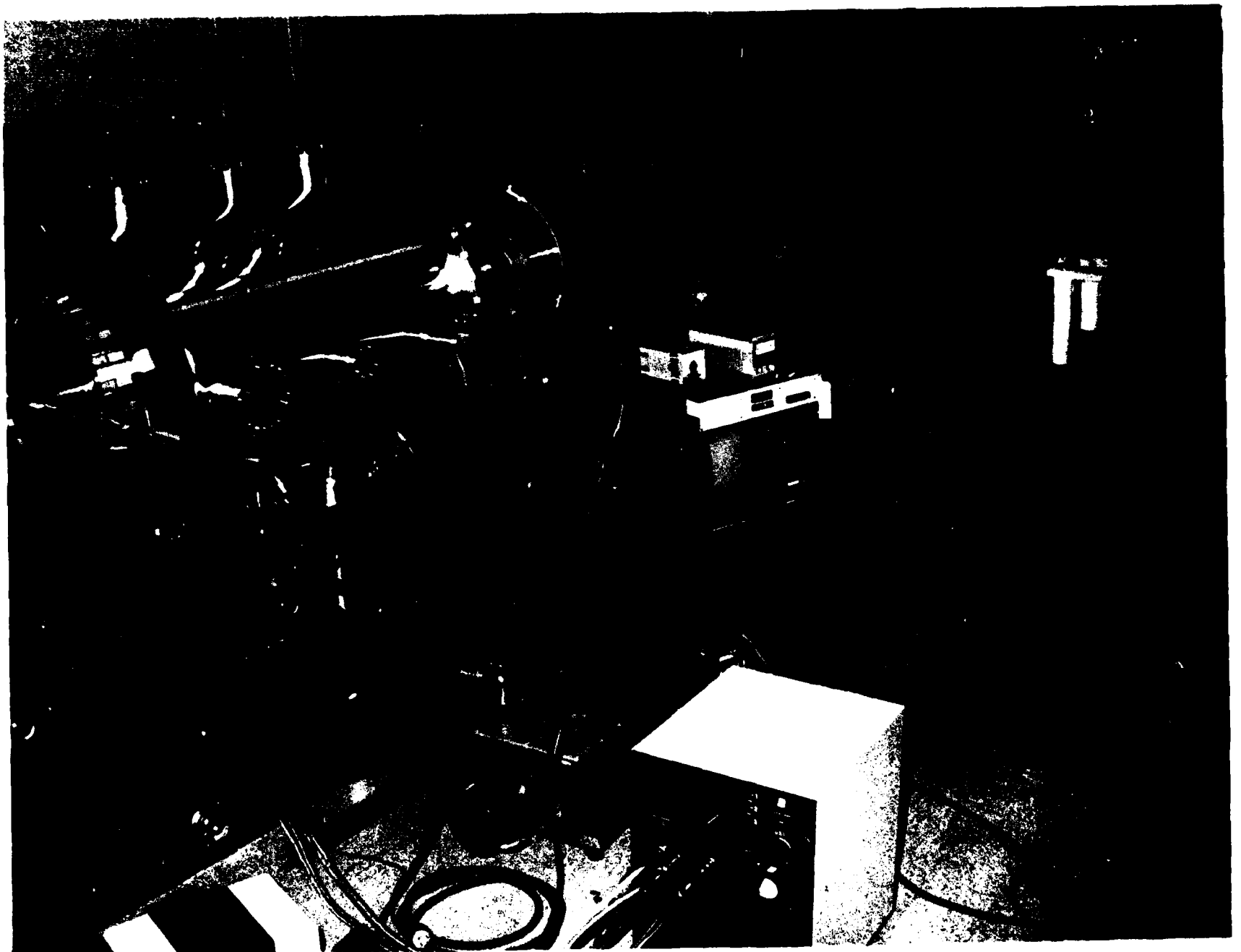
(513) 255-2923
AV 785-2923



Plasma Physics Laboratory

FACILITY TYPE:
Optics

PURPOSE:
Conduct research to develop advanced optical techniques to explore combustion and plasma environments

FACILITY NAME:
Optical Diagnostics Laboratory

PRIMARY CAPABILITIES:
Laser spectroscopy

Two-dimensional optical imaging

SPECIAL/UNIQUE CAPABILITIES:
CW argon-ion laser for pumping a dye laser

Nd:YAG-pumped dye laser; nitrogen laser-pumped dye laser

High speed 2-D imaging and image analysis system

INSTRUMENTATION:
Tunable UV to near IR pulsed laser source

High speed digitizer and photon detection systems

AVAILABILITY:
Primarily in-house research

Limited use by US Government contractors

LOCATION:
BUILDING: 450 ROOM: D101

POINT OF CONTACT:
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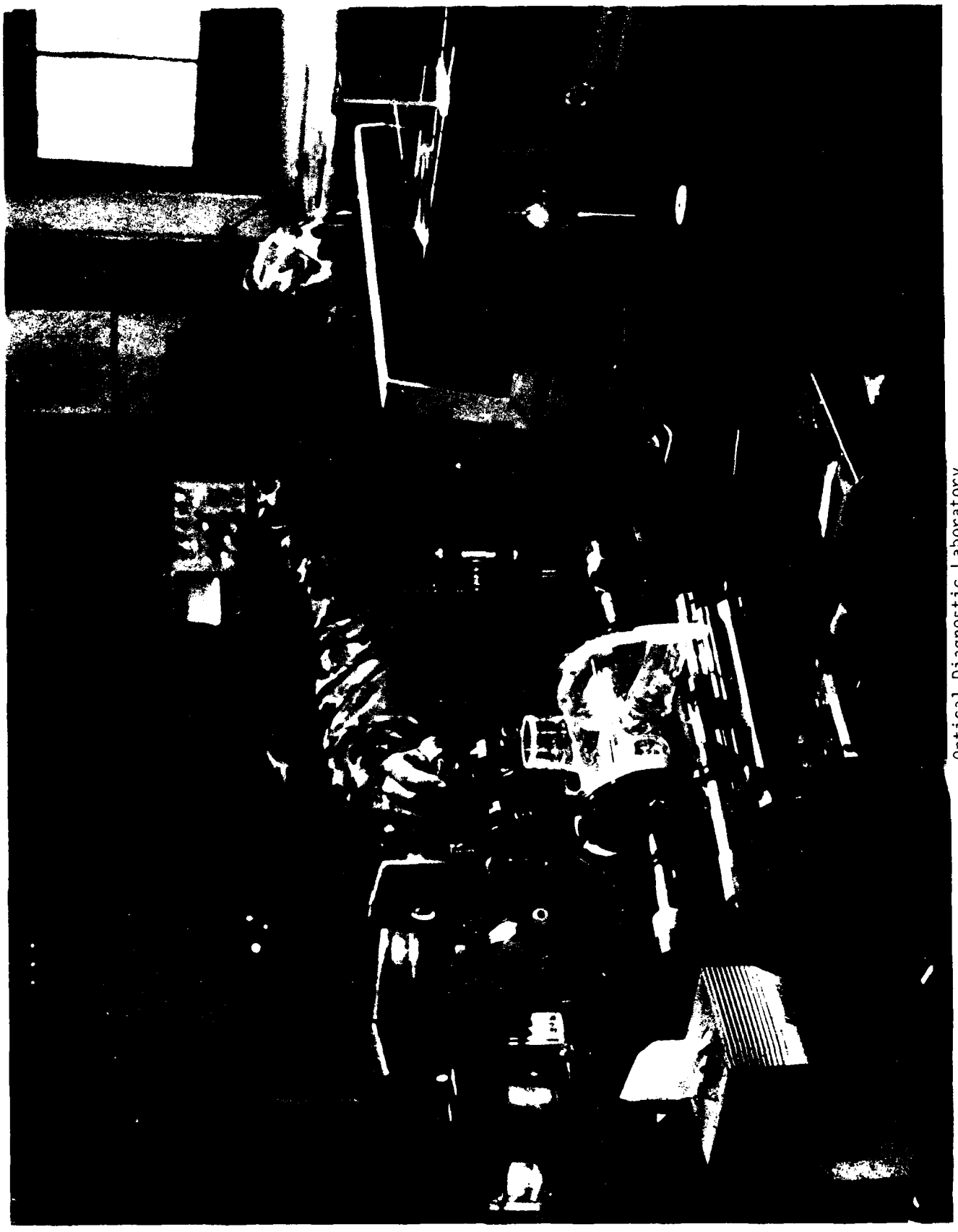


Optical Diagnostic Laboratory

FACILITY TYPE:

Battery R&D Laboratory

PURPOSE:

Research and development in electrochemical energy conversion

FACILITY NAME:

Battery Laboratory

PRIMARY CAPABILITIES:

Fabricate, evaluate and life test batteries/cells and fuel cells

Electrochemical analysis equipment and test facilities for continuous (24 hr/day) testing

SPECIAL/UNIQUE CAPABILITIES:

Chemical laboratory

Dry room with 2% or less relative humidity

Explosion-proof test isolation chambers

INSTRUMENTATION:

Gas chromatograph; differential scanning calorimeters;Fourier transform infrared spectrophotometer

Inert atmosphere chamber; microcalorimeter; thermogravimetric analyzer; battery automatic test equipment; redundant HP 1000 computer control/ data collection

Scanning electron microscope; time-lapse optical microscope; energy dispersive X-ray spectrometer

AVAILABILITY:

Primarily in-house research

Limited U.S. Government agency use

LOCATION:

BUILDING: 18B ROOM: 29-33

POINT OF CONTACT:

WRDC/POOS
WPAFB, OH 45433-6563
(513) 255-7770
AV 785-7770

Battery Laboratory

FACILITY TYPE:
Heat Transfer R&D Facility

PURPOSE:
Conduct basic and applied heat transfer research applicable to spacecraft power systems thermal management

FACILITY NAME:
Thermal Laboratory

PRIMARY CAPABILITIES:
Performance and life testing on electronic temperature and high temperature heat pipes

Thermal energy storage and transient heat transfer testing

Developmental work on capillary pump loop (CPL) technologies

SPECIAL/UNIQUE CAPABILITIES:
Clean room, dry box, fabrication area, liquid metal heat pipe fill station

Welding apparatus, heat transfer fluid processing and purification apparatus

Ammonia test facility with explosion-proof test cells, high vacuum/high temperature test chambers

INSTRUMENTATION:
Vacuum leak detection system, computer integrated automated data acquisition

Calorimeter, optical pyrometers (non-contact) temperature sensors

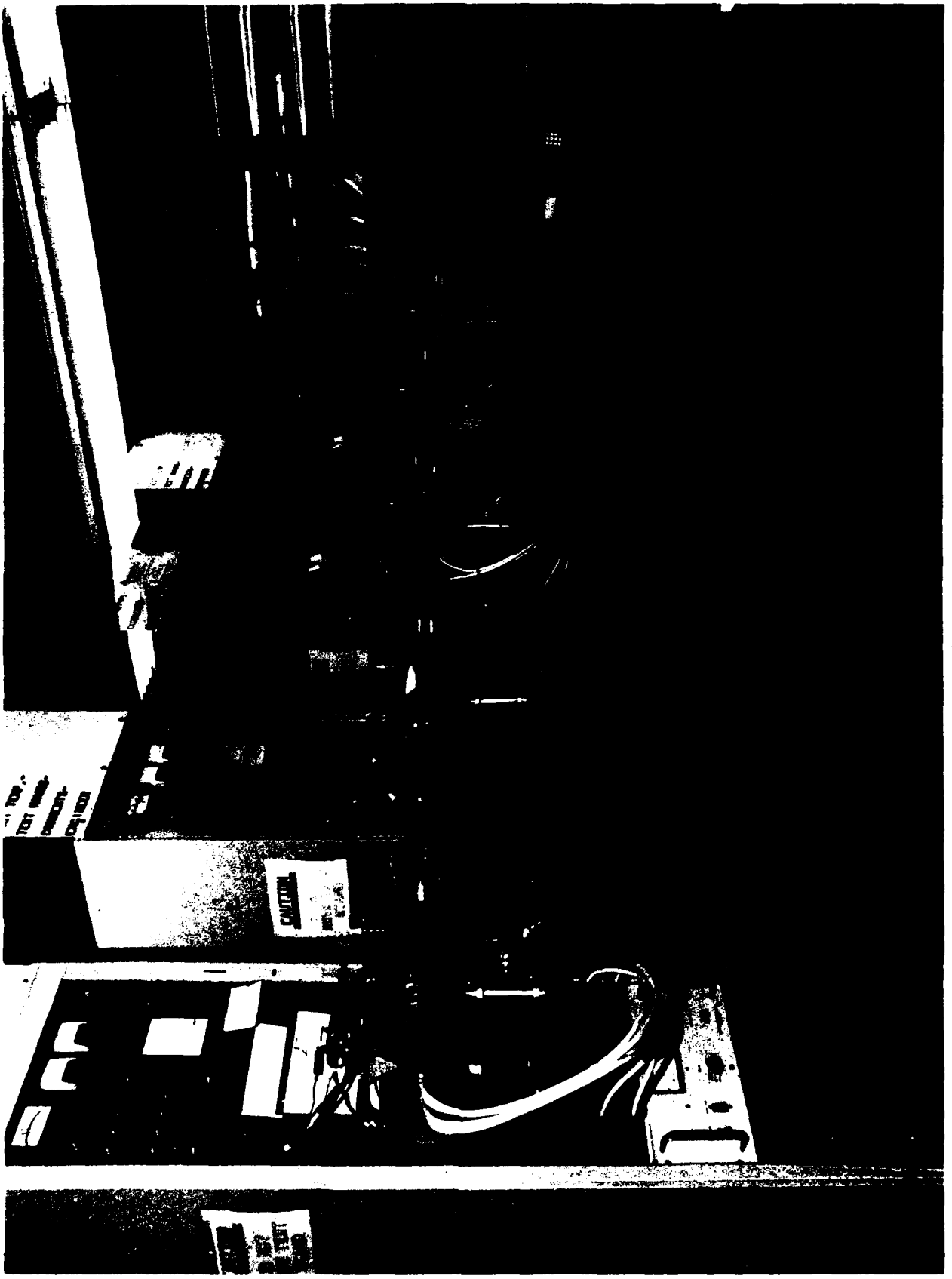
Inert gas atmosphere chambers, 100 KW refrigeration system

AVAILABILITY:
Primarily in-house research

Limited to US Government agency use

LOCATION:
BUILDING: 18G ROOM: 41-46

POINT OF CONTACT:
WRDC/POOS
WPAFB, OH 45433-6523
(513) 255-6241
AV 785-6241



Thermal Laboratory

FACILITY TYPE:
Pulsed High Voltage

PURPOSE:
Test stand for cathode development

FACILITY NAME:
Cathode Test Stand

PRIMARY CAPABILITIES:
500,000 V pulsed component testing

SPECIAL/UNIQUE CAPABILITIES:
500,000 V pulsed in an ultra-high vacuum environment

INSTRUMENTATION:
Optical and laser diagnostics system

AVAILABILITY:
Primarily for in-house research

Limited use by U.S. Government agencies and their contractors

LOCATION:
BUILDING: 450 ROOM: D08

POINT OF CONTACT:
WRDC/POOX
WPAFB, OH 45433-6563
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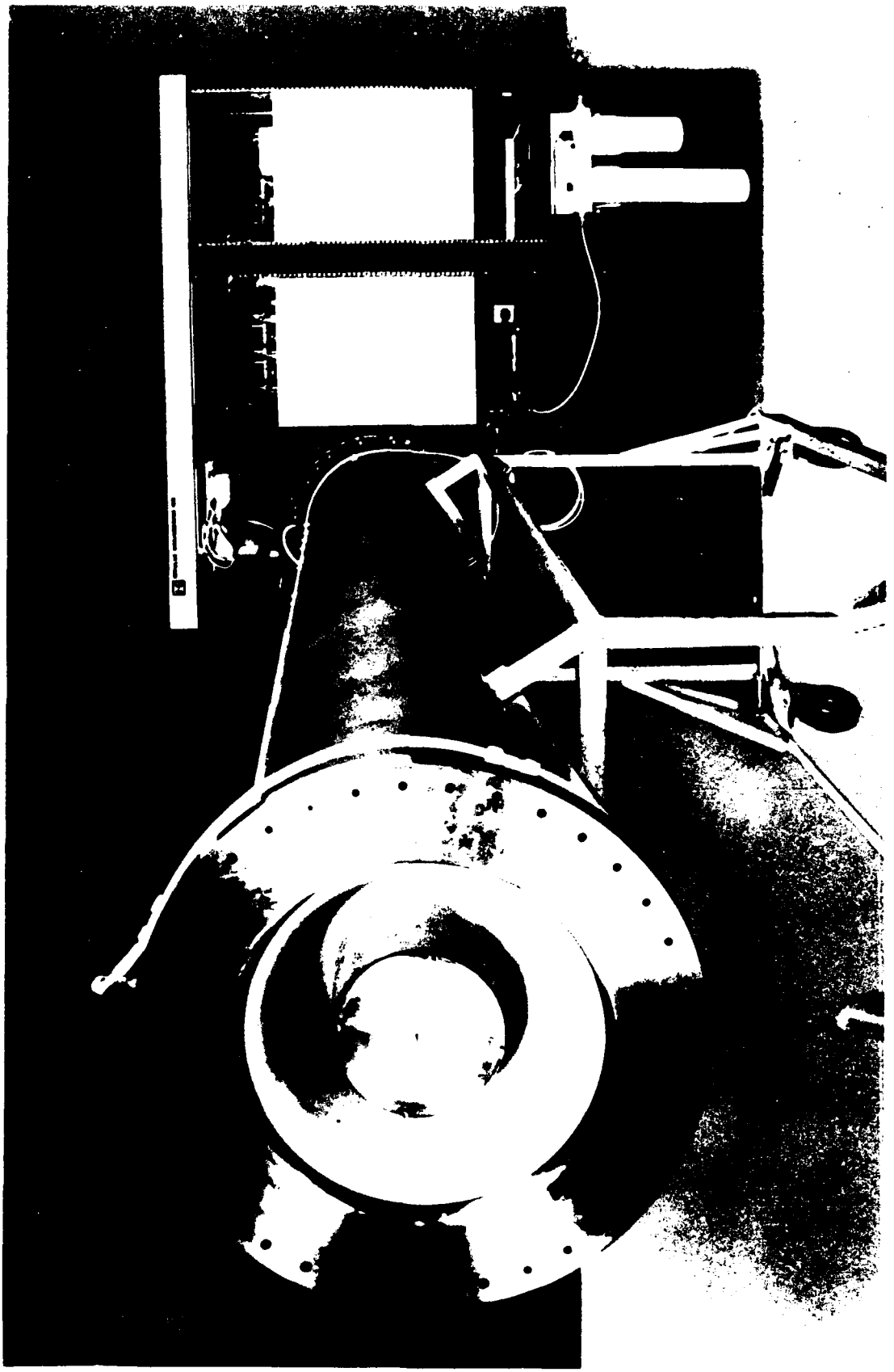

Cathode Test Stand

FACILITY TYPE:

Superconductivity

PURPOSE:

Synthesize various compositions of the high temperature superconductors, measure the electrical and magnetic properties, and determine practical uses

FACILITY NAME:

Superconductivity and Cryogenics Laboratory

PRIMARY CAPABILITIES:

Characterization of cryogenic properties of superconductors

SPECIAL/UNIQUE CAPABILITIES:

Two superconducting coils: 3-inch bore, 10 Tesla coil, 20 kilojoule repetitively pulsed coil

7 inch bore, cryogenically cooled 14 Tesla coil

INSTRUMENTATION:

Computer Controlled Variable Temperature (2-400K) and Field (0-5 Tesla) Squid Susceptometer

Variable Temperature (10-80K) and Field (0-10 Tesla) Transport Current Measurement Apparatus

RF Source Sputtering Rig, Optical Microscope, Furnaces

AVAILABILITY:

Air Force Contractors

LOCATION:

BUILDING: 450 ROOM: B08/19

POINT OF CONTACT:

WRDC/POOX
WPAFB, OH 45433-6563
(513) 255-4450
AV 785-6235

Superconductivity and Cryogenics Laboratory

FACILITY TYPE:
Electrical Power Systems

PURPOSE:
Develop materials, components and systems for very high power pulsed and steady state electrical systems

FACILITY NAME:
High Power Laboratory

PRIMARY CAPABILITIES:
Develop superconductors, inverters, high energy density inductive and capacitive energy storage and switches

Analyze dielectric breakdown

SPECIAL/UNIQUE CAPABILITIES:
5 MegaWatt/1 KiloVolt, 5 MegaWatt/400 Volt, 1 MegaWatt/0-120 Volt DC power supplies

1.5 MV/400 KV high voltage pulsers

80 KiloJoule high current pulser

INSTRUMENTATION:
Partial discharge analysis system

High voltage DC power supplies

AVAILABILITY:
Primarily in-house research

Limited U.S. Government agency use

LOCATION:
BUILDING: 450 ROOM: Hi Bay

POINT OF CONTACT:
WRDC/POOX
WPAFB, OH 45433-6563
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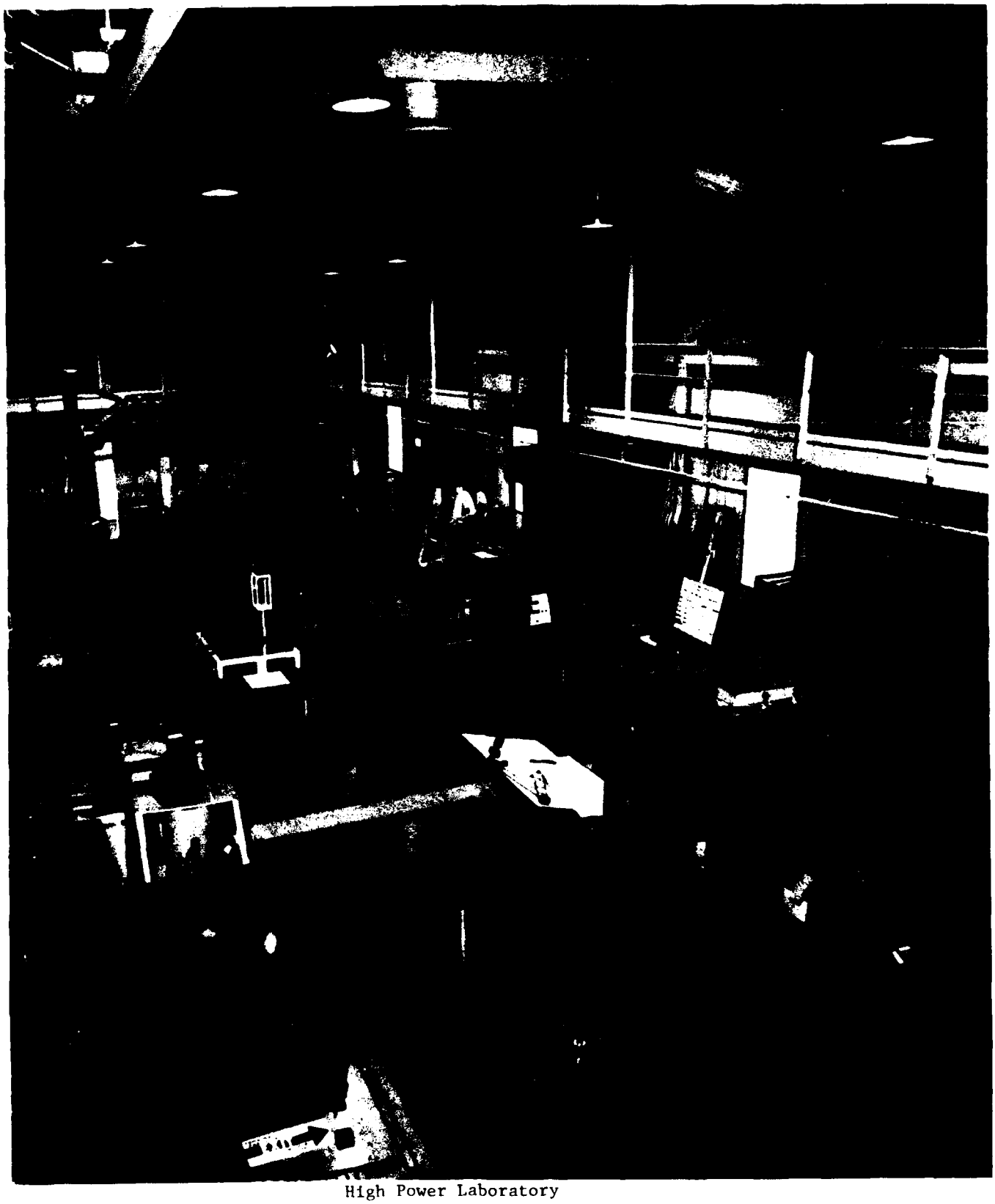


High Power Laboratory

FACILITY TYPE:

Ramjet combustion

PURPOSE:

Conduct basic and applied research on subsonic ramjet combustors

FACILITY NAME:

Ramjet Combustion Research Facility

PRIMARY CAPABILITIES:

Small scale, direct connect thrust stand (components up to 12 inch diameter and 60 inch length) with vitiated heater and oxygen replenishment system

Inlet temperatures from ambient to 1600 degF and thrust measurements up to 5,000 lbf

Flow capabilities are 15 lbm/sec at 750 psia

SPECIAL/UNIQUE CAPABILITIES:

Fuel injection test stand

Laser Doppler velocimeter

Water cooled test rig for flow field studies

INSTRUMENTATION:

Computers: Vaxstation 3200 (96 analog inputs); Neff System 470

Lasers: Argon Ion 5 watt; Argon Ion 10 watt

AVAILABILITY:

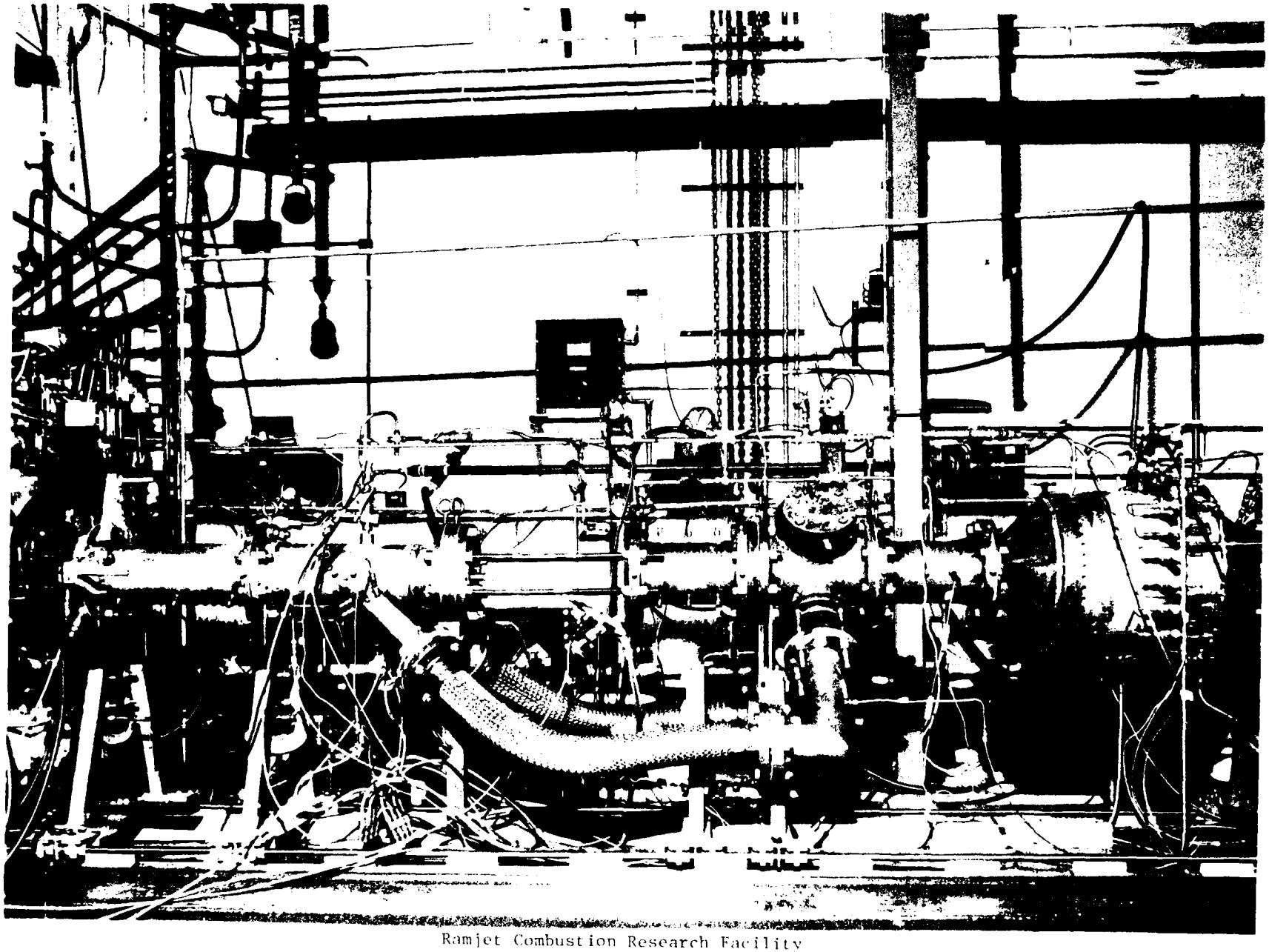
Available to U.S. Government agencies and DOD contractors

LOCATION:

BUILDING: 18C ROOM: 18

POINT OF CONTACT:

WRDC/POPT
WPAFB, OH 45433-6563
(513) 255-9991
AV 785-9991



Ramjet Combustion Research Facility

FACILITY TYPE:

Advanced Propulsion Combustion

PURPOSE:

Test air breathing engine components such as ramjet, turbo-ramjet and scramjet combustors

FACILITY NAME:

Air Breathing Combustor Research Facility

PRIMARY CAPABILITIES:

Test engine component (up to 24 inch diameter, 120 inch length) performance at both high and low altitudes

SPECIAL/UNIQUE CAPABILITIES:

Large scale, direct-connect thrust stand with vitiated air heater and liquid oxygen system capable of measuring up to 20,000 lbf of thrust

Shielded control room provides ability to process classified data

Subsonic or supersonic combustion experiments using either JP-4 or gaseous hydrogen (0.9 lbm/sec at 450 psia) as fuels

INSTRUMENTATION:

On-line data acquisition system

Computers: Vaxstation 3200 (96 analog inputs); Neff System 470

Lasers: Argon Ion 5 watt; Argon Ion 10 watt

AVAILABILITY:

Available to U.S. Government agencies and DOD contractors

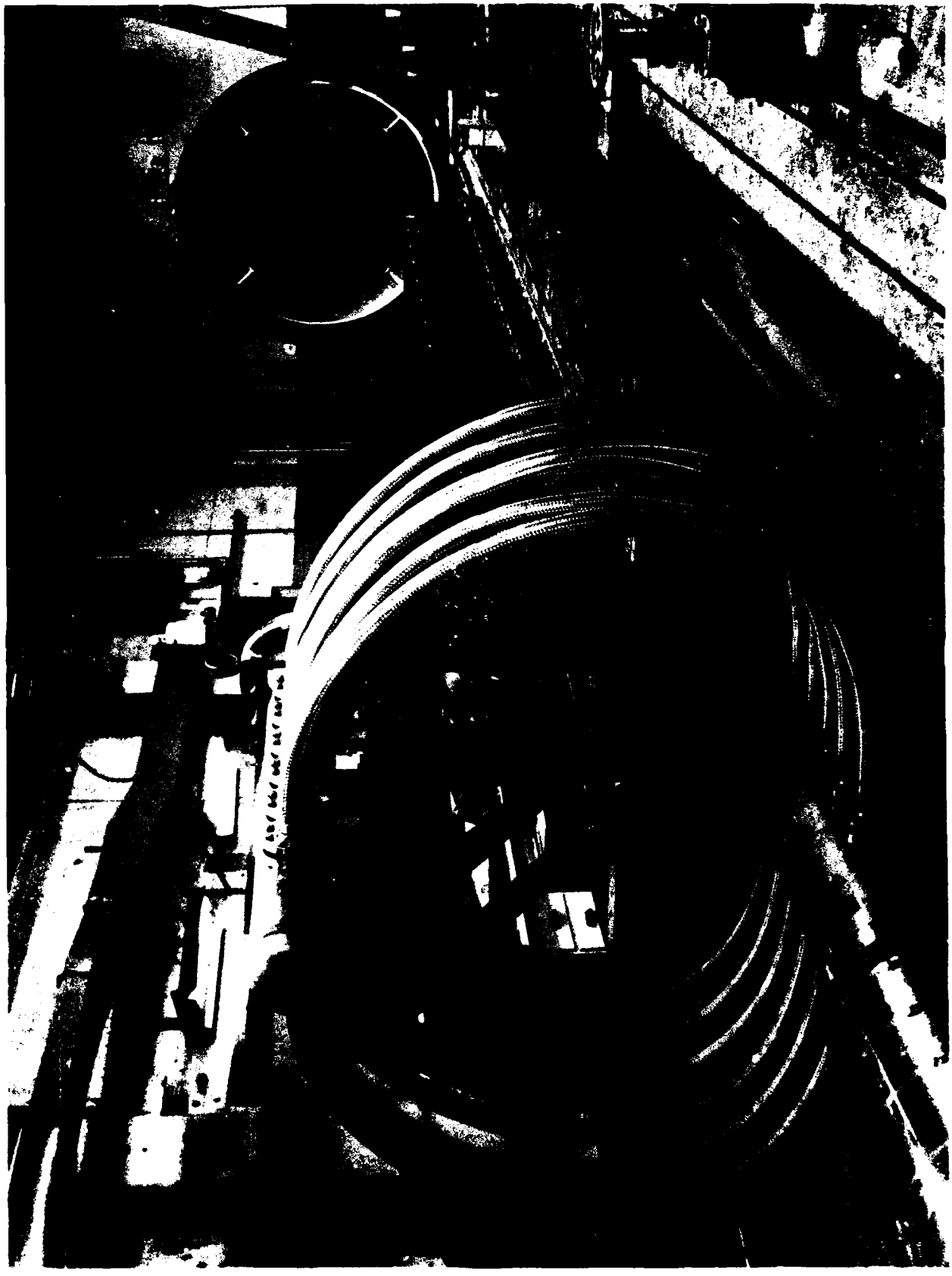
Available after June 1990

LOCATION:

BUILDING: 18E ROOM: 22

POINT OF CONTACT:

WRDC/POPT
WPAFB, OH 45433-6563
(513) 255-9991
AV 785-9991



Air Breathing Combustor Research Facility

FACILITY TYPE:
Water Tunnel

PURPOSE:
Conduct flow visualization experiments on different engine configurations

FACILITY NAME:
Flow Visualization Research Facility

PRIMARY CAPABILITIES:
Closed loop water tunnel holding over 1200 gallons of water

Flow rate from 30 to 1500 gallons/minute continuously

Rig test cell 23

SPECIAL/UNIQUE CAPABILITIES:
Three separate circuits of visualization enhancement

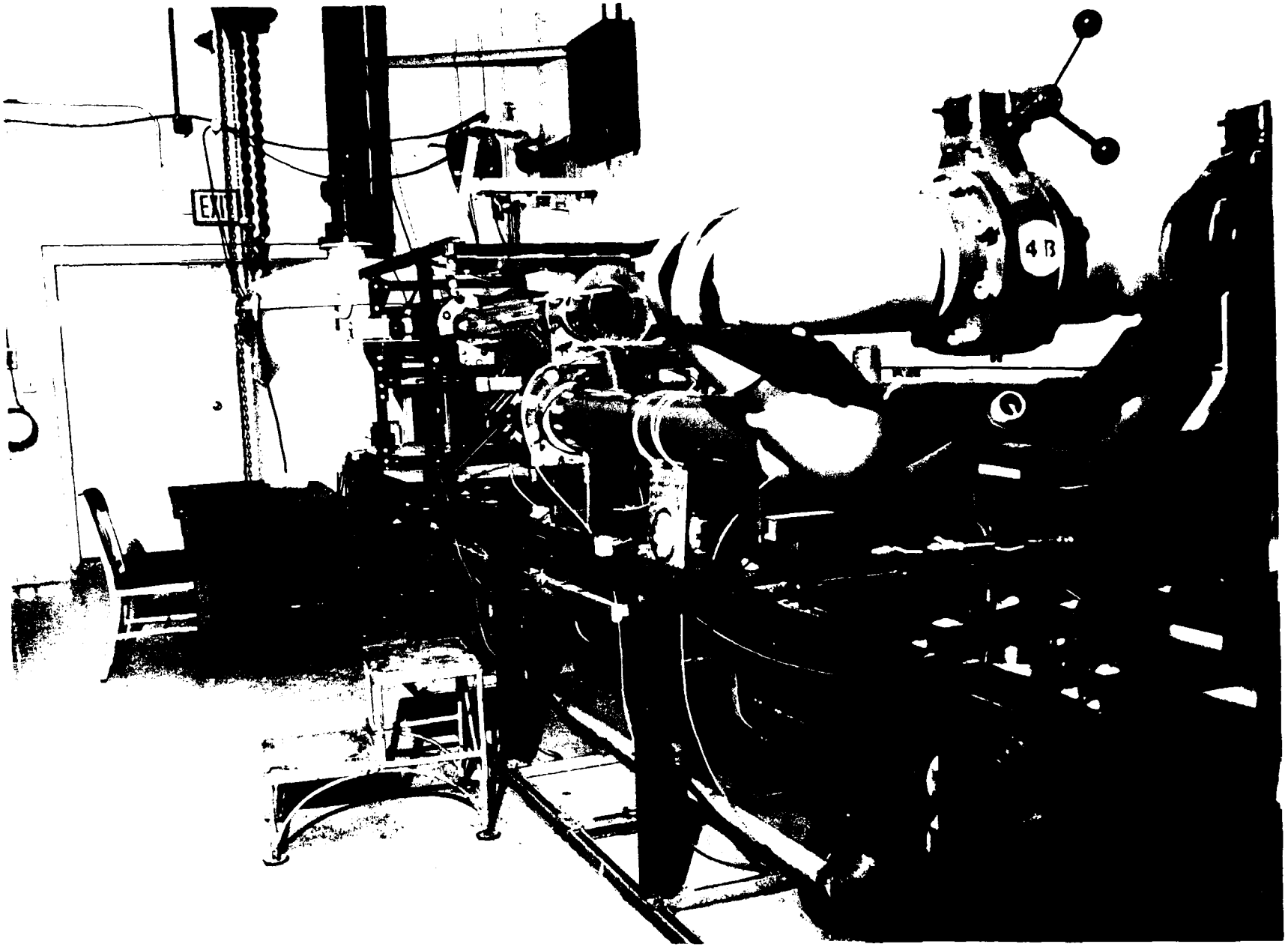
INSTRUMENTATION:
600 HDC vapor light source; dye, air, and hot water injection

Video camera systems for qualitative diagnostics

AVAILABILITY:
Available to U.S. Government agencies and DOD contractors

LOCATION:
BUILDING: 18E ROOM: 23

POINT OF CONTACT:
WRDC/POPT
WPAFB, OH 45433-6563
(513) 255-9991
AV 785-9991



Flow Visualization Research Facility

FACILITY TYPE:

Fuels

PURPOSE:

Evaluate fuel physical and chemical characteristics within various components of an aircraft fuel system under a variety of standard and extreme conditions

FACILITY NAME:

Reduced Scale Aircraft Engine/Airframe Fuel System Simulator (RSS)

PRIMARY CAPABILITIES:

Thermally stress fuel in a "real mission" mode

Emulate a large portion of the complete aircraft fuel system

SPECIAL/UNIQUE CAPABILITIES:

Evaluate thermal decomposition of fuels under simulated aircraft conditions, evaluate ways of maximizing and utilizing fuel as a heatsink

Examine fuel system hardware configurations

Evaluate new fuel system designs and retrofits on current fuel systems using minimal amounts of fuel

INSTRUMENTATION:

Conditioning tanks, heated wing tank, body tank

Environmental chamber, small orifice simulator, nozzle screen simulator

Fuel cooled oil cooler, generic tube heater

AVAILABILITY:

Primarily in-house research

Potentially available for limited use by Government contractors

LOCATION:

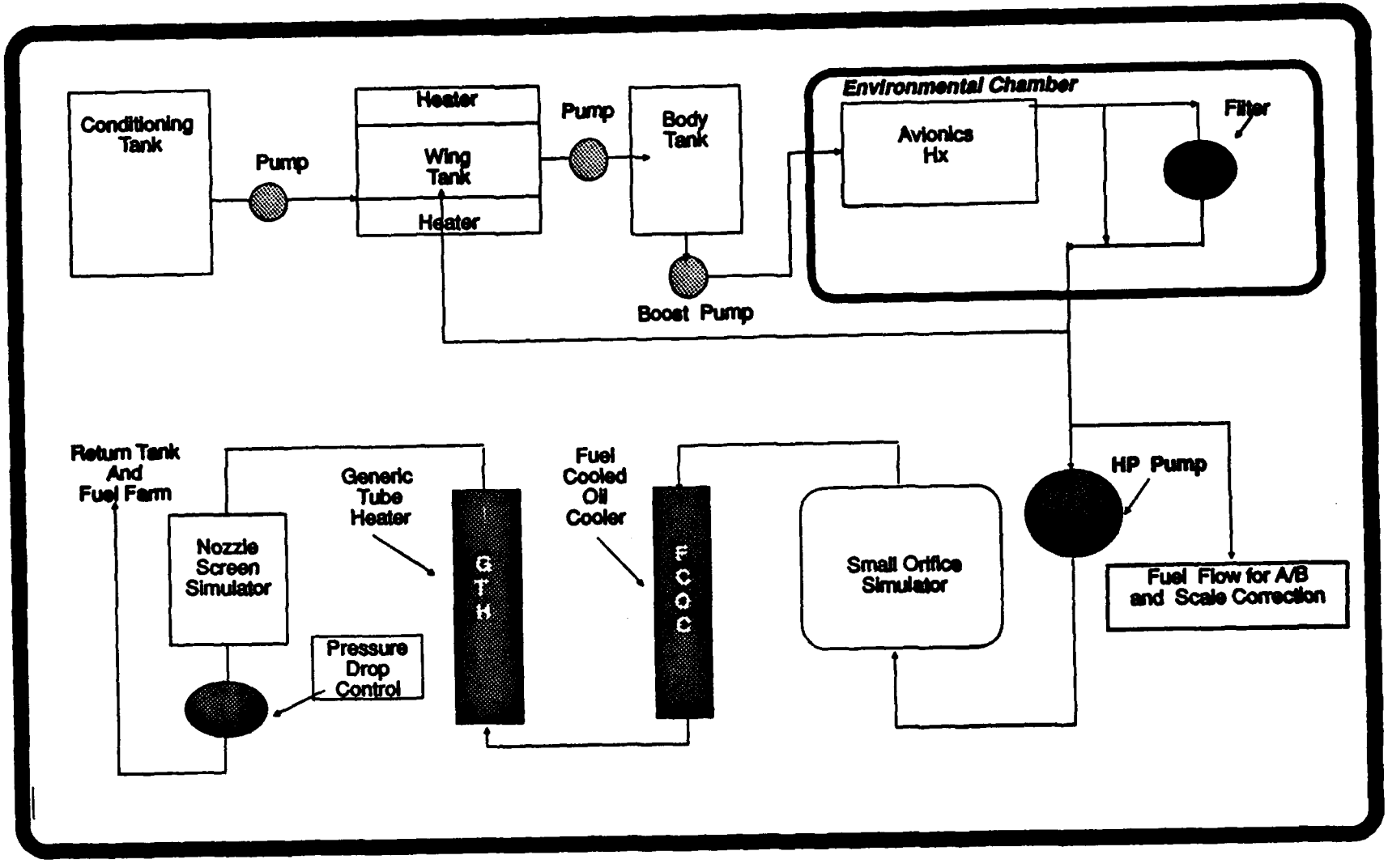
BUILDING: 490 ROOM: 150

POINT OF CONTACT:

WRDC/POSF
WPAFB, OH 45433-6563
(513) 255-3527
AV 785-3527

ADVANCED FUEL/FUEL SYSTEM EVALUATION

USAF Reduced Scale Engine/Aircraft Fuel System Simulator



FACILITY TYPE:

Fuels

PURPOSE:

Characterize and quantify liquid fuels for Air Force aircraft gas turbine engines and conduct research into future fuels for advanced aircraft systems

FACILITY NAME:

Fuels Research Laboratory

PRIMARY CAPABILITIES:

Identify fuel constituents qualitatively and quantitatively using liquid and gas chromatographic instruments

SPECIAL/UNIQUE CAPABILITIES:

Sophisticated chemometric software availabel to determine relationships between chemical composition and fuel performance

INSTRUMENTATION:

High-performance liquid chromatographs (2), high resolution capillary gas chromatographs (2)

Multi-dimensional gas chromatograph with mass selective detection

Gas chromatograph with oxygen-specific detection, gas chromatograph with nitrogen specific detection

AVAILABILITY:

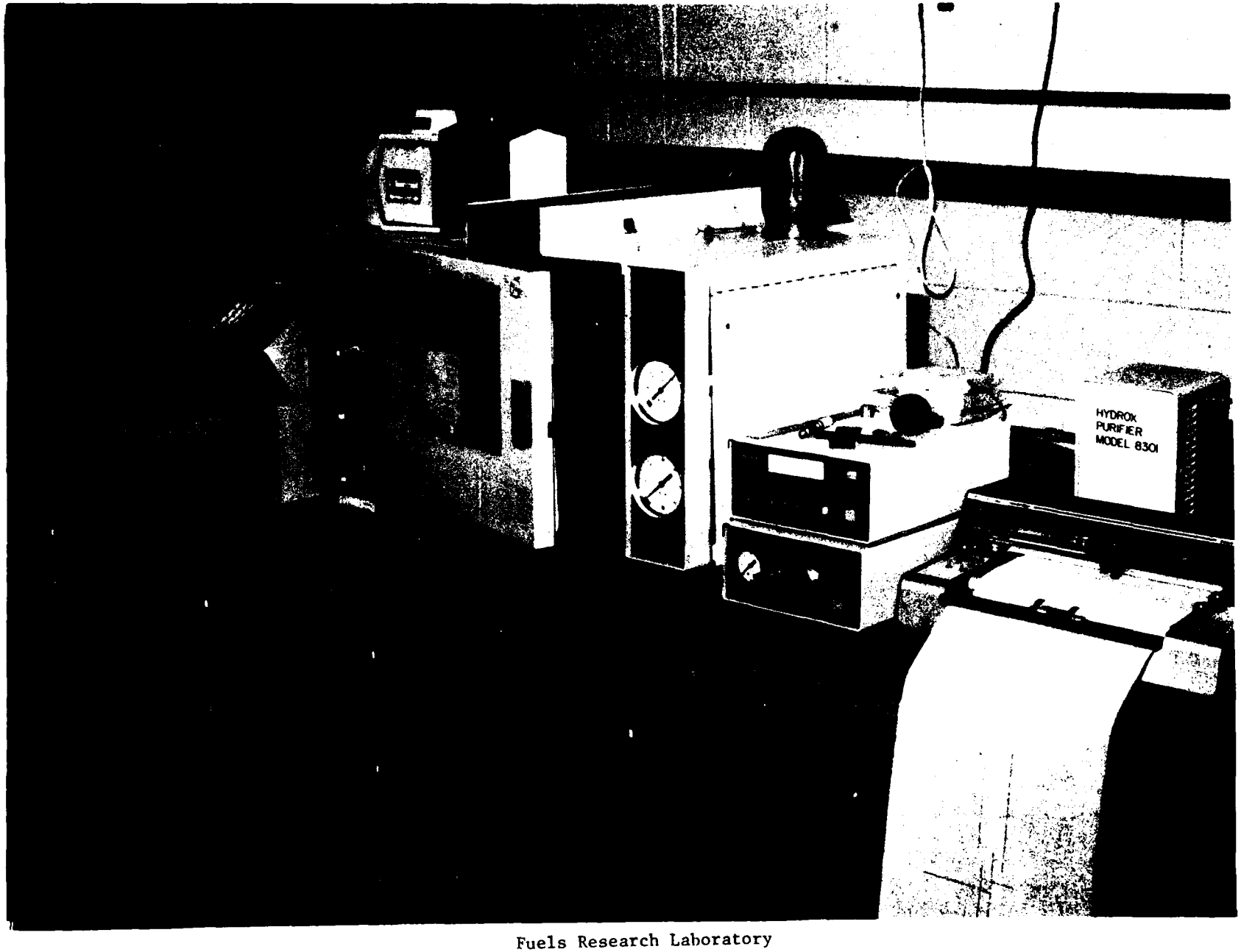
Primarily in-house research

LOCATION:

BUILDING: 490 ROOM: 205

POINT OF CONTACT:

WRDC/POSF
WPAFB, OH 45433-6563
(513) 255-5106
AV 785-5106



Fuels Research Laboratory

FACILITY TYPE:

Fuels

PURPOSE:

Evaluate the thermal behavior of fuels in a controlled high temperature environment and endothermic fuel/catalyst systems

FACILITY NAME:

Fuels Thermal and Catalytic Research Laboratory

PRIMARY CAPABILITIES:

Evaluate wide variety of fuels for thermal stability and degradation over a wide range of temperatures, pressures, and resident times

SPECIAL/UNIQUE CAPABILITIES:

Interchangeable reaction cells allow greater flexibility in experiment design

Atmospheric Pressure Pyrolysis, High-Pressure Liquid-Phase Pyrolysis, Atmospheric Pressure Catalysis, High-Pressure Liquid-Phase Catalysis

Reaction cells can be designed to model specific applications; solid, liquid, and gas-phase fuels can be tested

INSTRUMENTATION:

System for Thermal Diagnostic Studies (STDS) configured for flame ionization, mass selective, and infrared spectra detectors

State-of-the-art Fourier transform infrared spectrometer covering visible to far-IR frequencies

AVAILABILITY:

High priority projects from any government agency can be scheduled

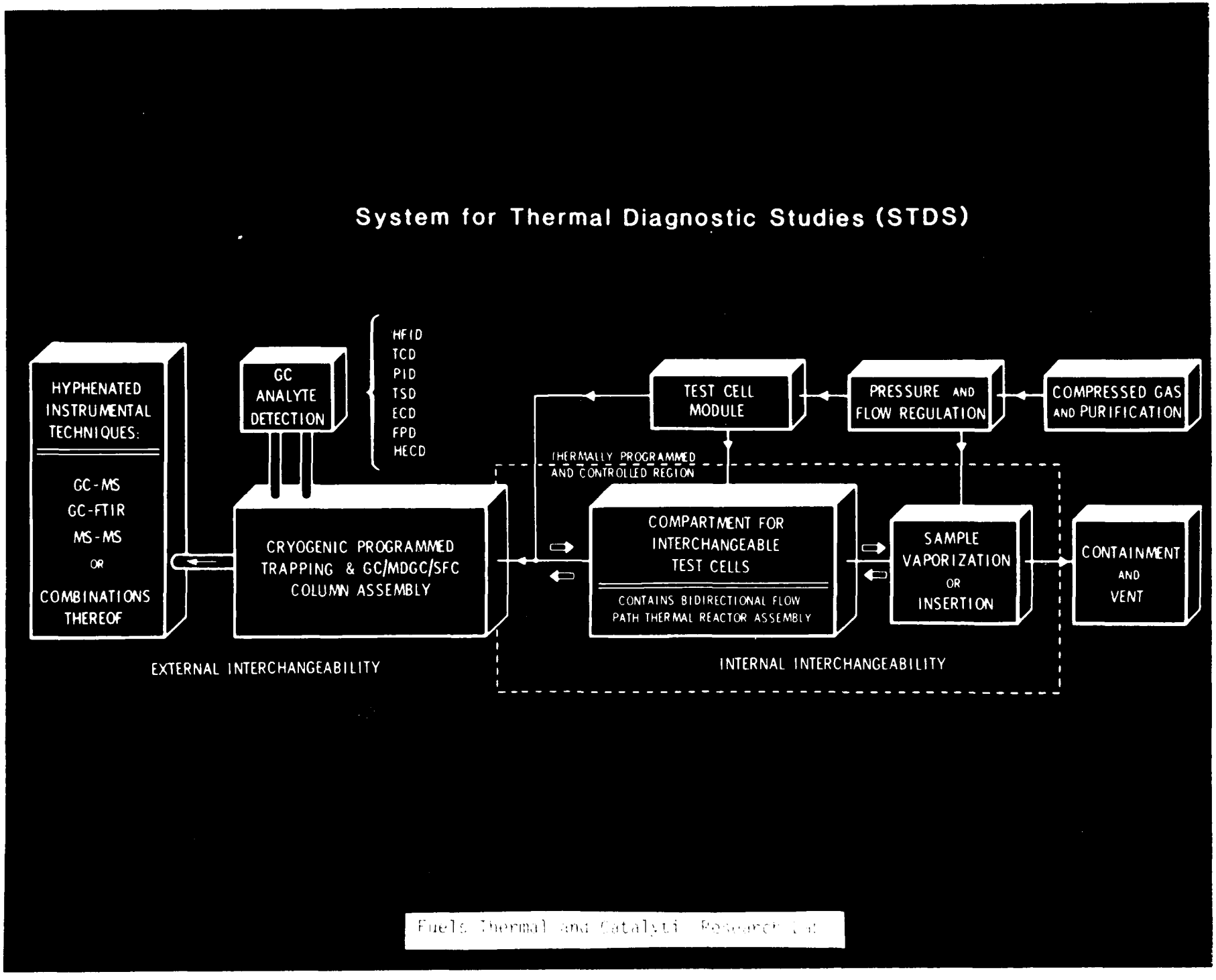
Projects scheduled on a limited basis

LOCATION:

BUILDING: 490 ROOM: 206

POINT OF CONTACT:

WRDC/POSF
WPAFB, OH 45433-6563
(513) 255-5106
AV 785-5106



Fuels Thermal and Catalyti Research Lab

FACILITY TYPE:
Fuels

PURPOSE:
Evaluate the elevated temperature storage characteristics of fuels

FACILITY NAME:
Fuels Storage Oven

PRIMARY CAPABILITIES:
Store drum quantities of fuel in an elevated temperature environment for determination of long term storage characteristics

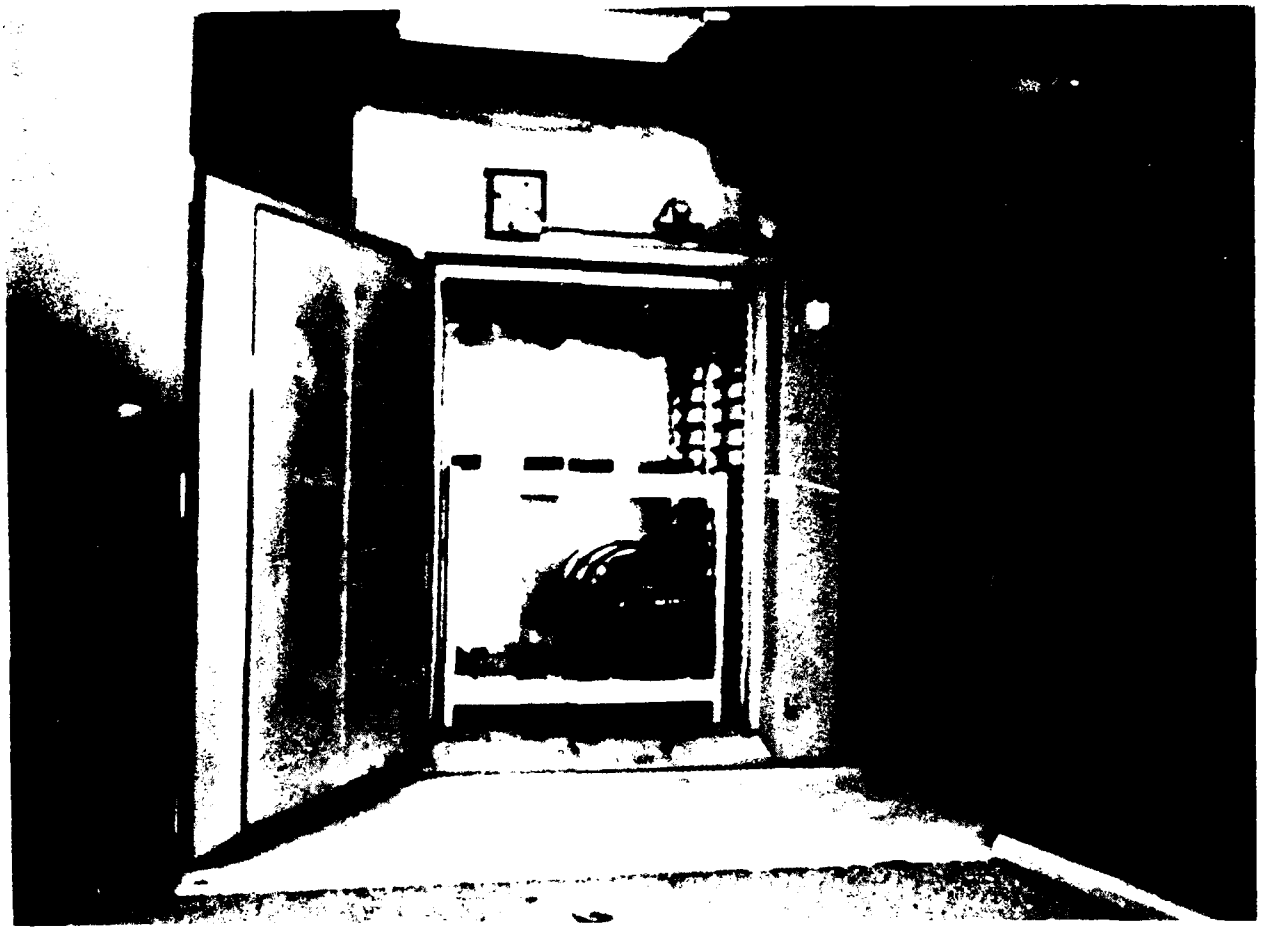
SPECIAL/UNIQUE CAPABILITIES:
Drum quantities of fuel can be stored at temperatures as high as 130 degF

INSTRUMENTATION:
Partlow Temperature Controller

AVAILABILITY:
In-house research activities

LOCATION:
BUILDING: 490 ROOM: 160

POINT OF CONTACT:
WRDC/POSF
WPAFB, OH 45433-6563
(513) 255-5106
AV 785-5106



FACILITY TYPE:

Fuels

PURPOSE:

Makes research quantities of test fuels

FACILITY NAME:

Hydrogenation Research System (HRS)

PRIMARY CAPABILITIES:

Simulate a wide range of typical refinery technologies

Add hydrogen and remove sulfur, nitrogen and oxygen from fuels

Evaluate catalysts, dehydrogenation kinetics and process candidate endothermic fuels

SPECIAL/UNIQUE CAPABILITIES:

HRS is state-of-the-art pilot plant which can be converted for hydrogenation or dehydrogenation studies

INSTRUMENTATION:

Two downflow trickle bed reactors in series in computer controlled plant contain travelling thermocouples to monitor temperature in beds

Flow scheme set to use either one or two reactors

AVAILABILITY:

Primarily in-house research

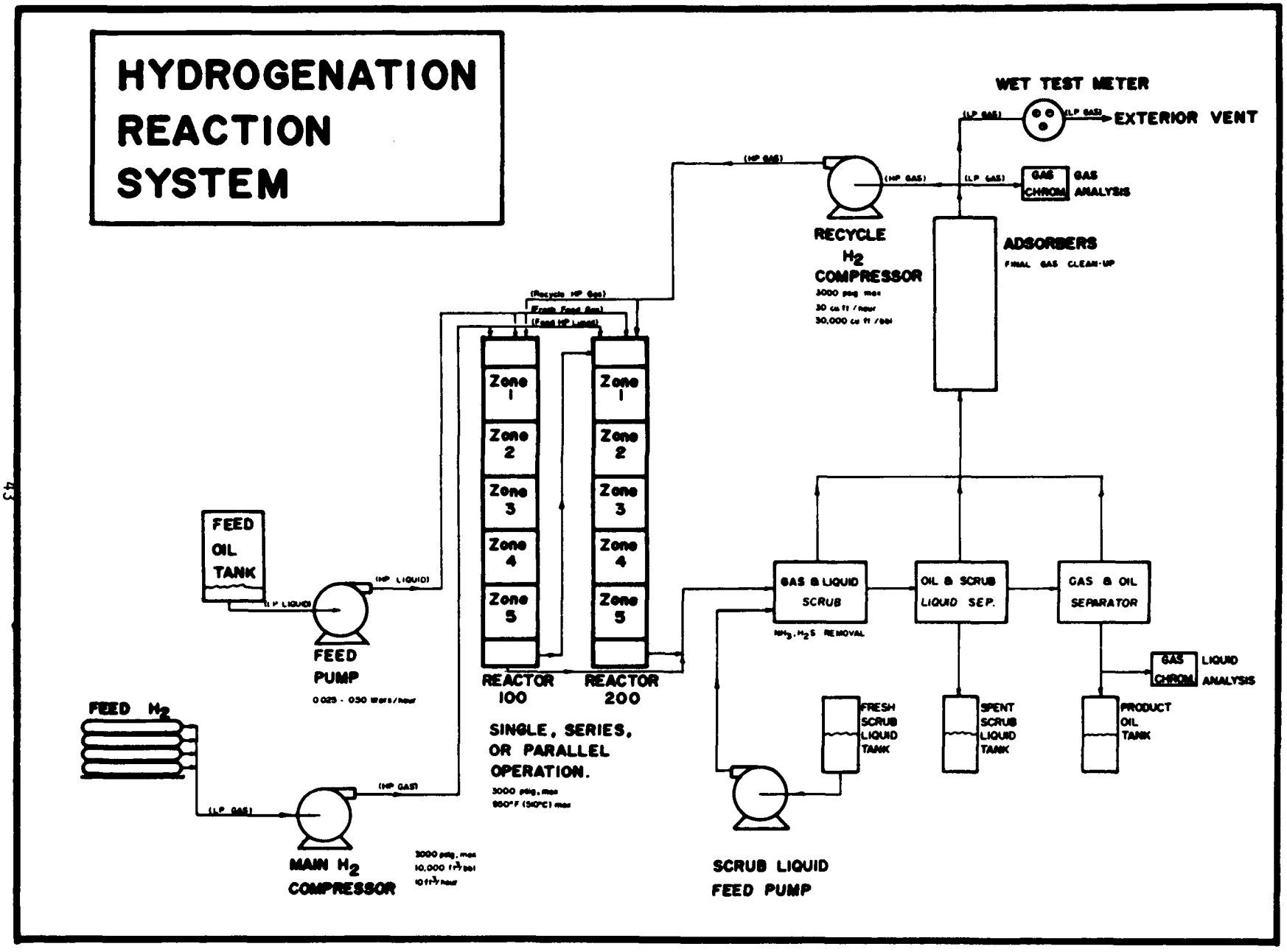
Potentially available for limited use by Government contractors

LOCATION:

BUILDING: 490 ROOM: 150

POINT OF CONTACT:

WRDC/POSF
WPAFB, OH 45433-6563
(513) 255-3527
AV 785-3527


HYDROGENATION REACTION SYSTEM
WET TEST METER
EXTERIOR VENT
GAS CHROM
GAS ANALYSIS
RECYCLE H2 COMPRESSOR
3000 psig max
30 cu ft / hour
30,000 cu ft / bbl
ADSORBERS
FINAL GAS CLEAN-UP
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
FEED OIL TANK
FEED PUMP
0.025 - 0.30 liters / hour
REACTOR 100
REACTOR 200
SINGLE, SERIES, OR PARALLEL OPERATION.
3000 psig, max
850°F (510°C) max
GAS & LIQUID SCRUB
OIL & SCRUB LIQUID SEP.
GAS & OIL SEPARATOR
NH3, H2S REMOVAL
GAS CHROM
LIQUID ANALYSIS
FRESH SCRUB LIQUID TANK
SPENT SCRUB LIQUID TANK
PRODUCT OIL TANK
FEED H2
MAIN H2 COMPRESSOR
3000 psig, max
10,000 ft3/bbl
10 ft3/hour
SCRUB LIQUID FEED PUMP

FACILITY TYPE:

Fuel Spray

PURPOSE:

Conduct fundamental research of two phase flows including turbulence intensity, transport and evaporation phenomena

FACILITY NAME:

Spray Research Laboratory

PRIMARY CAPABILITIES:

Study two phase flows and single droplets

Generate multiple and single drops in reacting and nonreacting sprays

SPECIAL/UNIQUE CAPABILITIES:

Measure simultaneously temperature, two velocity components specie concentration, and particle size at a single point

INSTRUMENTATION:

Coherent Anti-Stokes Raman Spectrometer capable of making point temperature and specie concentration measurements

Aerometrics Phase Doppler Particle Analyzer capable of making two-component velocity and particle size measurements

Argon Ion laser and optics for flow visualization studies

AVAILABILITY:

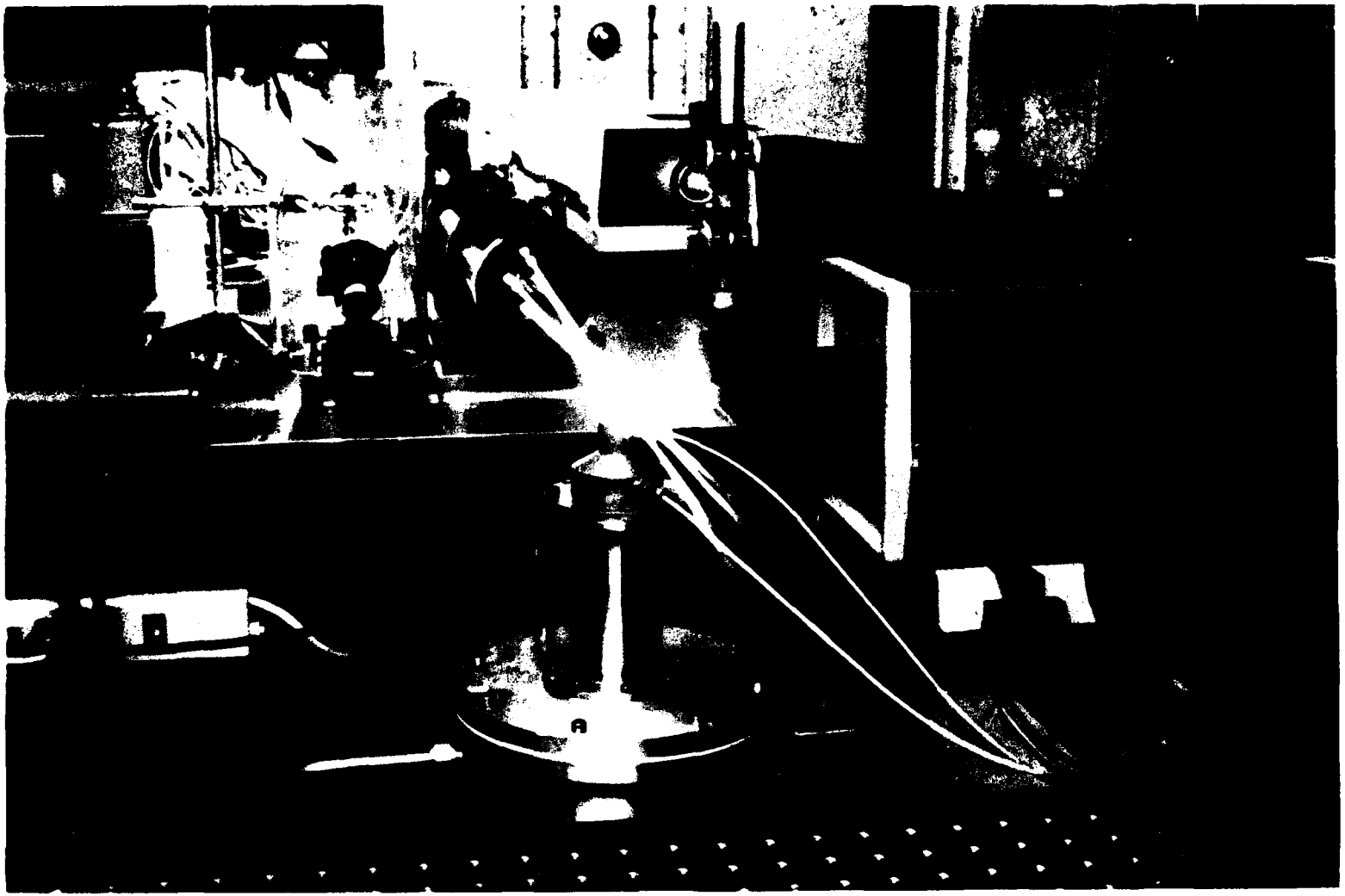
Primarily in-house research

LOCATION:

BUILDING: 18C ROOM: 17

POINT OF CONTACT:

WRDC/POSF
WPAFB, OH 45433-6563
(513) 255-5106
AV 785-5106



PHASE DOPPLER PARTICLE ANALYZER WITH RESEARCH NOZZLE

Spray Research Laboratory

FACILITY TYPE:
Combustion

PURPOSE:
Provide benchmark quality data from large scale research combustors for use in validating combustion models

FACILITY NAME:
Combustion Research Facility

PRIMARY CAPABILITIES:
Two test air sources: #1 - flow rates up to 34 lbm/sec, pressures up to 750 psig, temperatures up to 1100 deg F;

#2 - flow rates up to 7.5 lbm/sec at 300 psig and ambient temperature

Gaseous fuels and liquid gas turbine fuels availabel at flow rates up to 40 lbm/hr

Rig test cell 20

SPECIAL/UNIQUE CAPABILITIES:
Coherent Anti-Stokes Raman and Phase Doppler Particle Analyzer laser diagnostics combination

Detailed data on temperature, velocity, drop size, and drop distribution in reacting and nonreacting environments

Gas analysis instruments available to determine products of combustion using extraction type probes

INSTRUMENTATION:
Mini computer/data acquisiton system

Networking provides access to larger main frames

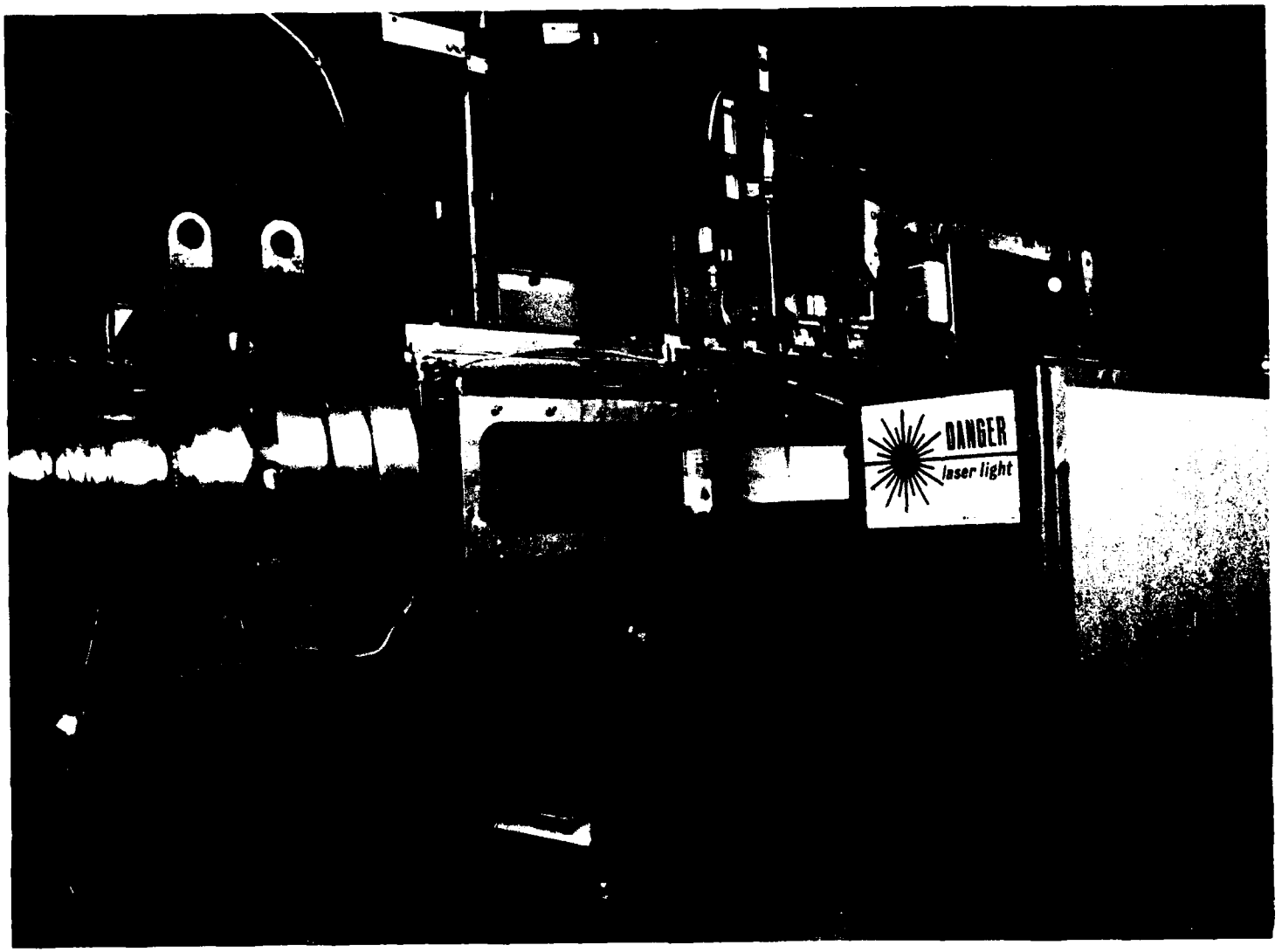
Maximum of 128 separate analog inputs provide temperature, pressure and location measurements

AVAILABILITY:
Primarily in-house research

Limited use by Government contractors

LOCATION:
BUILDING: 18C ROOM: 20

POINT OF CONTACT:
WRDC/POSF
WPAFB, OH 45433-6563
(513) 255-5106
AV 785-5106



RESEARCH COMBUSTOR AND CARS SYSTEM

Combustion Research Facility

FACILITY TYPE:

Combustion

PURPOSE:

Study fundamentals of combustion, provide benchmark quality data for use in validating computational fluid dynamics models

FACILITY NAME:

Combustion Fundamentals Laboratory

PRIMARY CAPABILITIES:

Non-intrusive measurements of combustion-related properties made downstream of small research combustors

Research combustors possess many characteristic of aviation gas turbine combustors

Wide variety of gaseous fuels, including hydrogen, can be burned in research combustion

Maximum fuel rate 4.9 scfms; maximum air flow rate 2,500 scfm

SPECIAL/UNIQUE CAPABILITIES:

Three component laser Doppler anemometer, and coherent anti-stokes Raman spectroscopy system

Combustor provides ease of configuration change and burns a large variety of fuels

INSTRUMENTATION:

Flow visualization system using mie scattering

Three component laser Doppler anemometer

AVAILABILITY:

Primarily in-house research

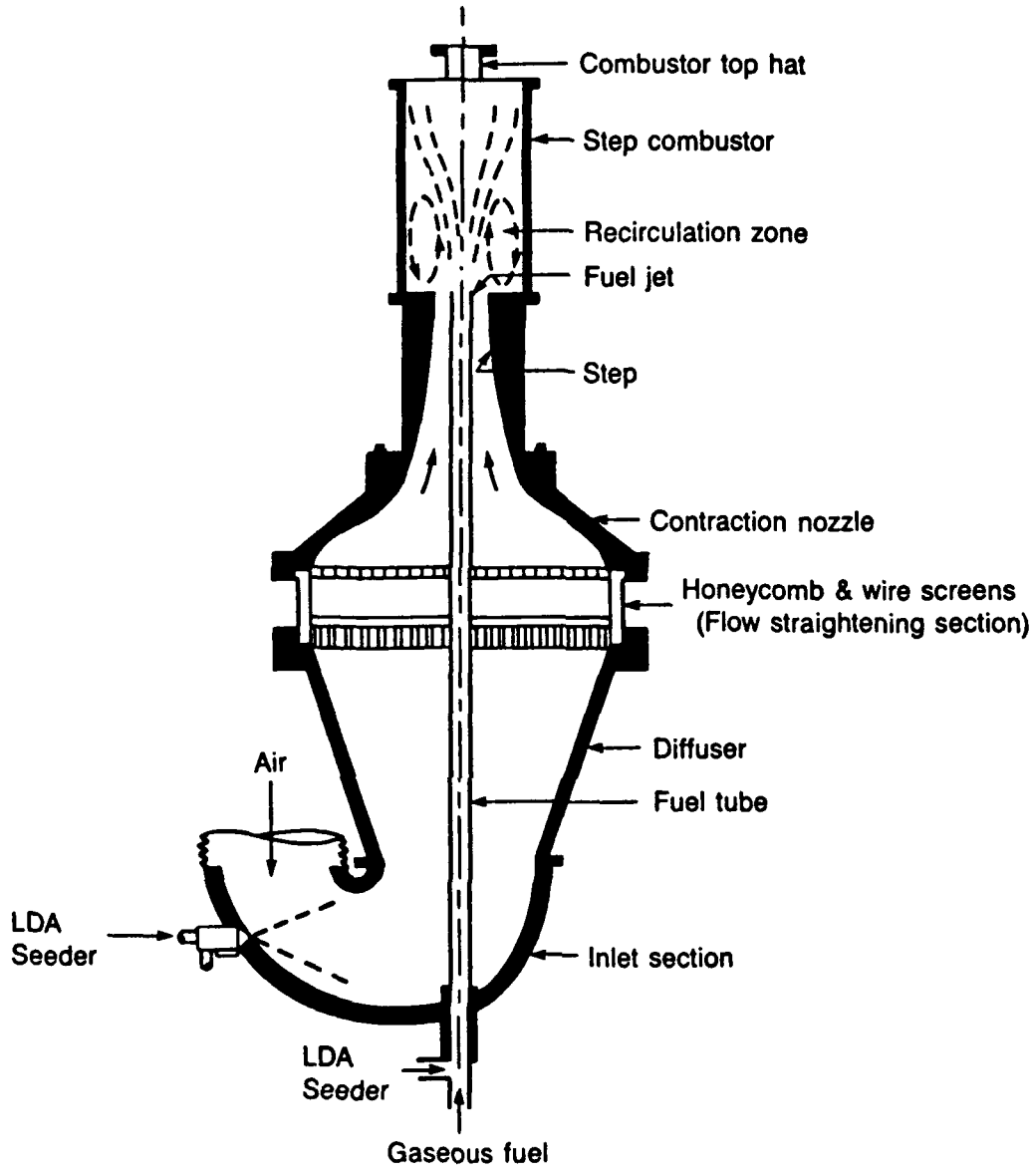
Limited use by Government contractors

LOCATION:

BUILDING: 490 ROOM: 153

POINT OF CONTACT:

WRDC/POSF
WPAFB, OH 45433-6563
(513) 255-5106
AV 785-5106



TURBULENT FLAME BURNER SHOWN WITH A STEP COMBUSTOR

Combustion Fundamentals Laboratory

FACILITY TYPE:
Advanced Diagnostics

PURPOSE:
Develop advanced laser diagnostics hardware and techniques for use in fundamental combustion research

FACILITY NAME:
Combustion Diagnostics Laboratory

PRIMARY CAPABILITIES:
Develop laser diagnostics and quantitative imaging tools

SPECIAL/UNIQUE CAPABILITIES:
Advanced two-dimensional quantitative imaging device

INSTRUMENTATION:
YAG die laser, 2-dimensional fluorescence system

Small vertical research burner capable of 3-axis traversing

AVAILABILITY:
Primarily in-house research

Potentially available for cooperative Government/industry research

LOCATION:
BUILDING: 450 ROOM: E120

POINT OF CONTACT:
WRDC/POSF
WPAFB, OH 45433-6563
(513) 255-5106
AV 785-5106

OPTICAL DIAGNOSTIC SYSTEM FOR MAKING REACTING FLOW MEASUREMENTS

Combustion Diagnostics Laboratory

FACILITY TYPE:
Bearings

PURPOSE:
Provide full-scale test capability for performance analysis and evaluation of full-scale aircraft bearings;provide data to validate dynamic computer codes

FACILITY NAME:
Full-Scale Bearing Tester

PRIMARY CAPABILITIES:
Accomodate full-scale bearings (typically 100 mm bore)

Test bearings under actual engine operating speed conditions

SPECIAL/UNIQUE CAPABILITIES:
Fifty hp dc motor driving a test head to 30,000 rpm

Roller slip and cage radial and axial displacement can be measured and monitored during testing

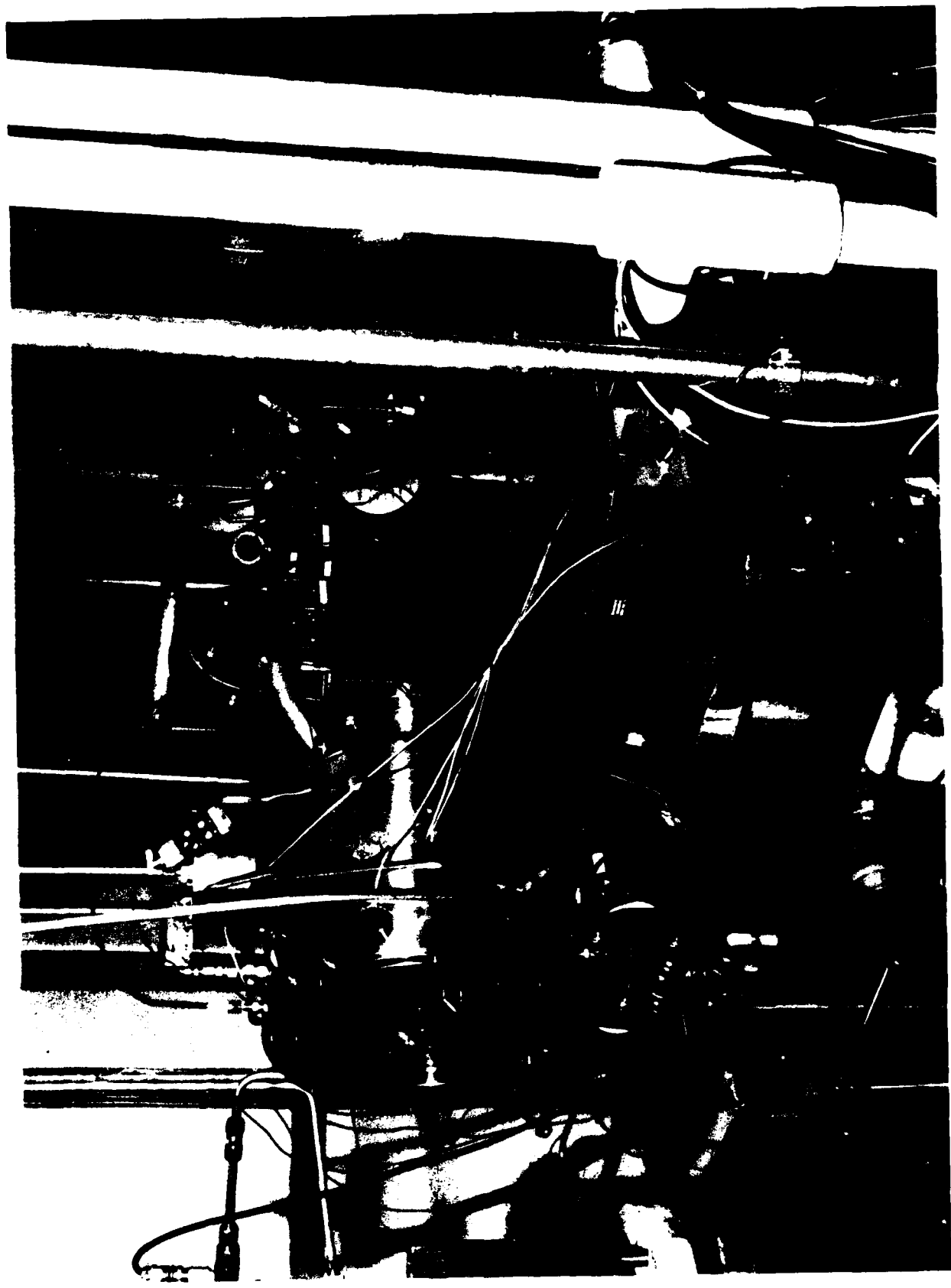
INSTRUMENTATION:
Radial and axial eddy-current probes to measure displacement of the bearing cage during test

Oscilloscope and FM recorder

AVAILABILITY:
In-house use only

LOCATION:
BUILDING: 490 ROOM: 127

POINT OF CONTACT:
WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-1286
AV 785-1286



Full-Scale Bearing Tester

FACILITY TYPE:
Bearings

PURPOSE:
Evaluate subscale bearing and/or gear specimens for rolling contact fatigue resistance

FACILITY NAME:
Bearing and Gear Material Fatigue Tester

PRIMARY CAPABILITIES:
Evaluate coating adherence and bearing steel life characteristics under rolling contact fatigue

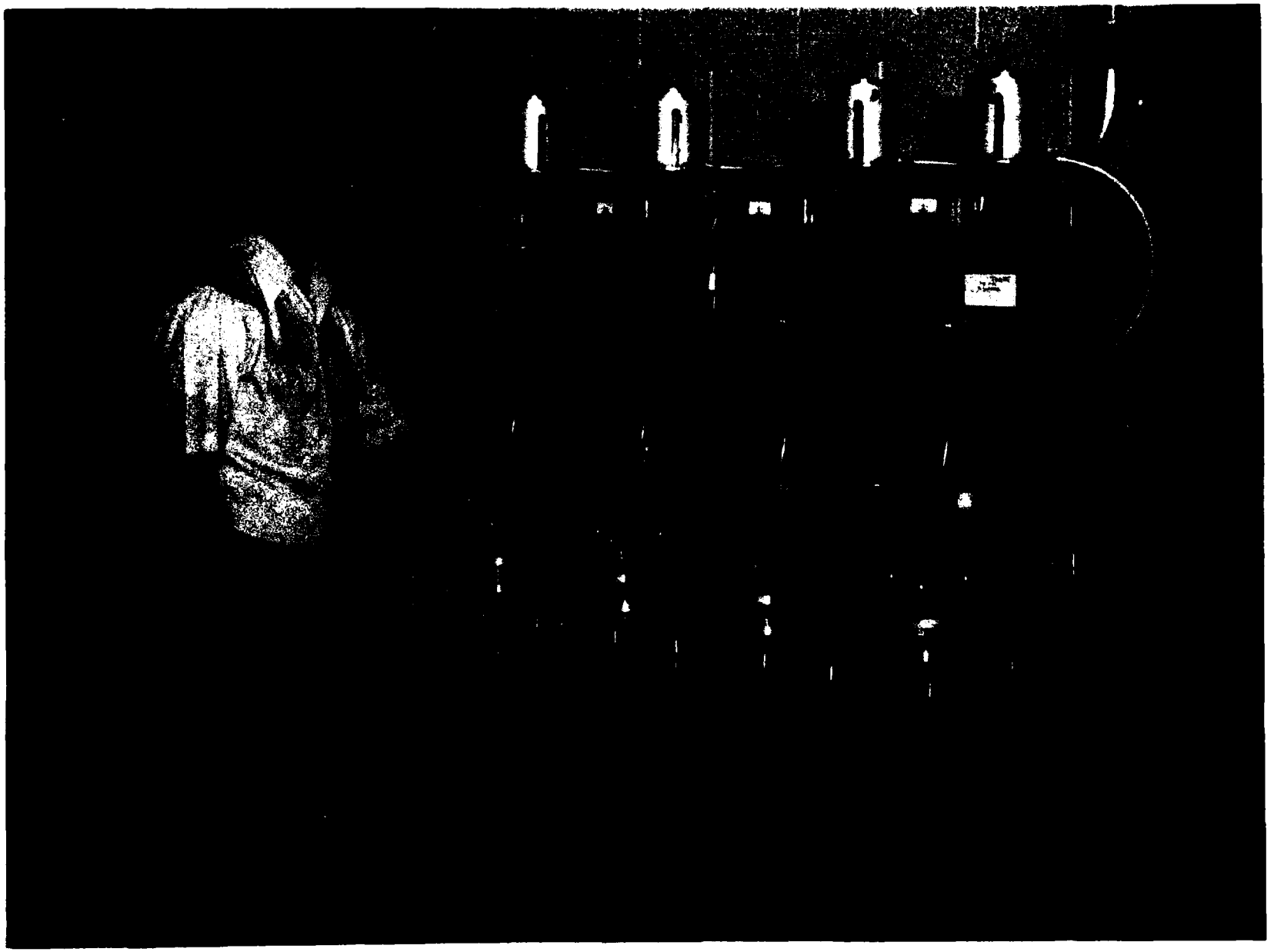
SPECIAL/UNIQUE CAPABILITIES:
Rolling Contact Fatigue Tester-rotating cylindrical test specimen alternately stressed by rolling contact with 3 radially loaded balls or 2 crowned discs

INSTRUMENTATION:
Accelerometer coupled with a shutdown device to monitor vibration caused by fatigue

AVAILABILITY:
In-house use only

LOCATION:
BUILDING: 490 ROOM: 124

POINT OF CONTACT:
WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-4939
AV 785-4939



Bearing and Gear Material Fatigue Tester

FACILITY TYPE:
Bearings

PURPOSE:
Evaluate lubricant film thickness and traction under rolling and sliding contacts

FACILITY NAME:
Optical EHD Test Rig

PRIMARY CAPABILITIES:
Measure lubricant film thickness via optical interferometry

Measure traction (analogous to lubricant friction)

SPECIAL/UNIQUE CAPABILITIES:
Speed capability up to 400 in/sec; contact pressures up to 300 ksi; temperature up to 400 degF

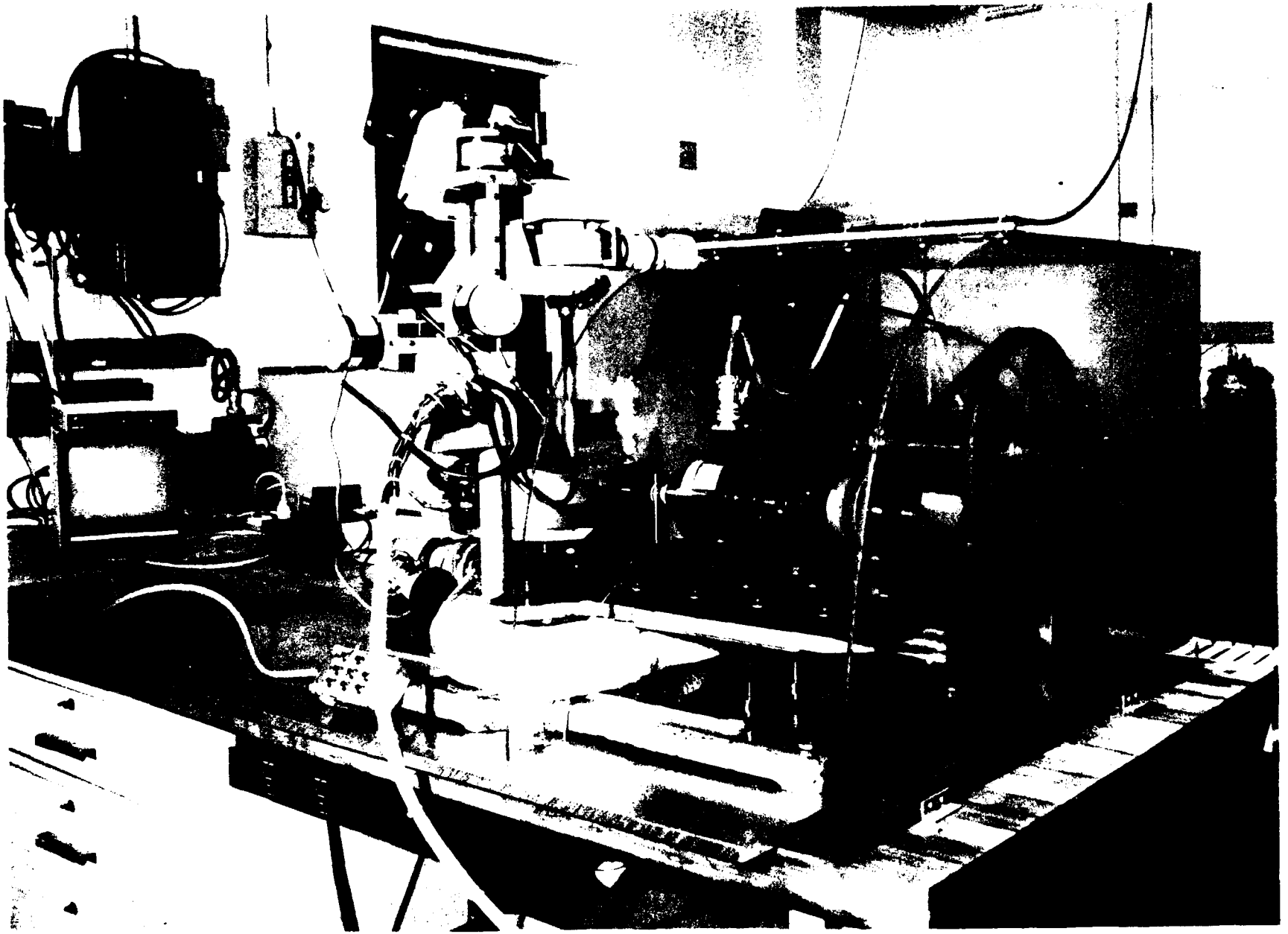
INSTRUMENTATION:
35mm camera, video camera

Microscope, thermocouples, torque sensor, shaft speed sensors

AVAILABILITY:
In-house use only

LOCATION:
BUILDING: 490 ROOM: 133

POINT OF CONTACT:
WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-4939
AV 785-4939



Optical EHD Test Rig

FACILITY TYPE:
Bearings

PURPOSE:
Provide traction measurements under high speed, high load conditions for military lubricants

FACILITY NAME:
Traction Test Rig

PRIMARY CAPABILITIES:
Measure traction values at pressures up to 400 ksi and rolling speeds of 4000 in/sec

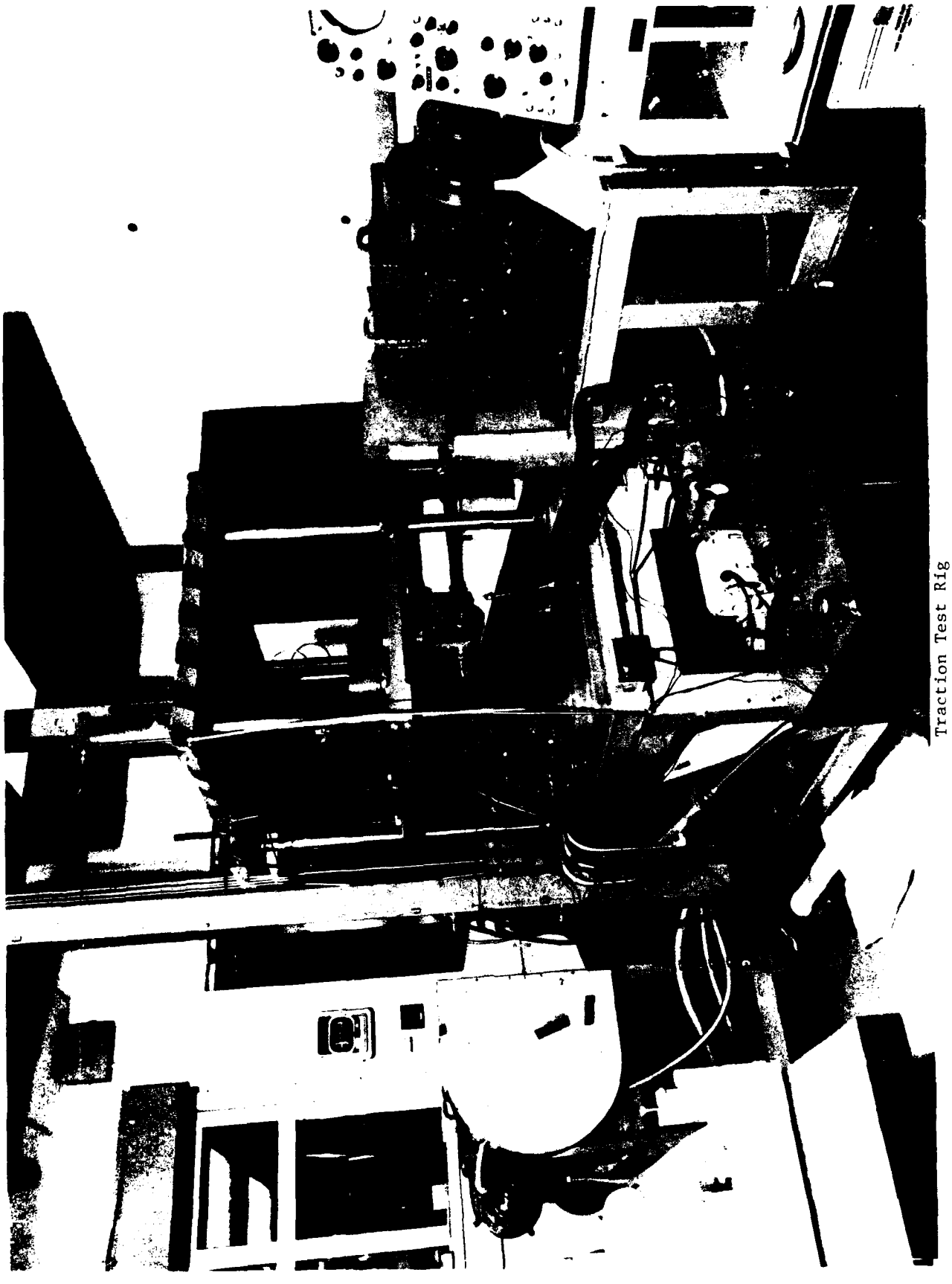
SPECIAL/UNIQUE CAPABILITIES:
Only test rig capable of generating extreme pressures and rolling speeds for advanced bearing operating conditions

INSTRUMENTATION:
Torque sensor, load cell, desk top computer data acquisition and automatic control system

AVAILABILITY:
In-house use only

LOCATION:
BUILDING: 490 ROOM: 135

POINT OF CONTACT:
WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-7477
AV 785-7477



Traction Test Rig

FACILITY TYPE:

Bearings

PURPOSE:

Provide data on viscosity and density of liquid lubricants at very high pressures

FACILITY NAME:

High Pressure Viscometer

PRIMARY CAPABILITIES:

Measure viscosity and density at pressures up to 435,000 psi at temperatures up to 325 degF

Measure viscosity up to 10exp6 poise

SPECIAL/UNIQUE CAPABILITIES:

Pressure chamber 3/4 in dia by 5 in long filled with experimental lubricants

INSTRUMENTATION:

Linear Variable Differential Transformer to measure velocity of sinker falling in lubricant at high pressure

AVAILABILITY:

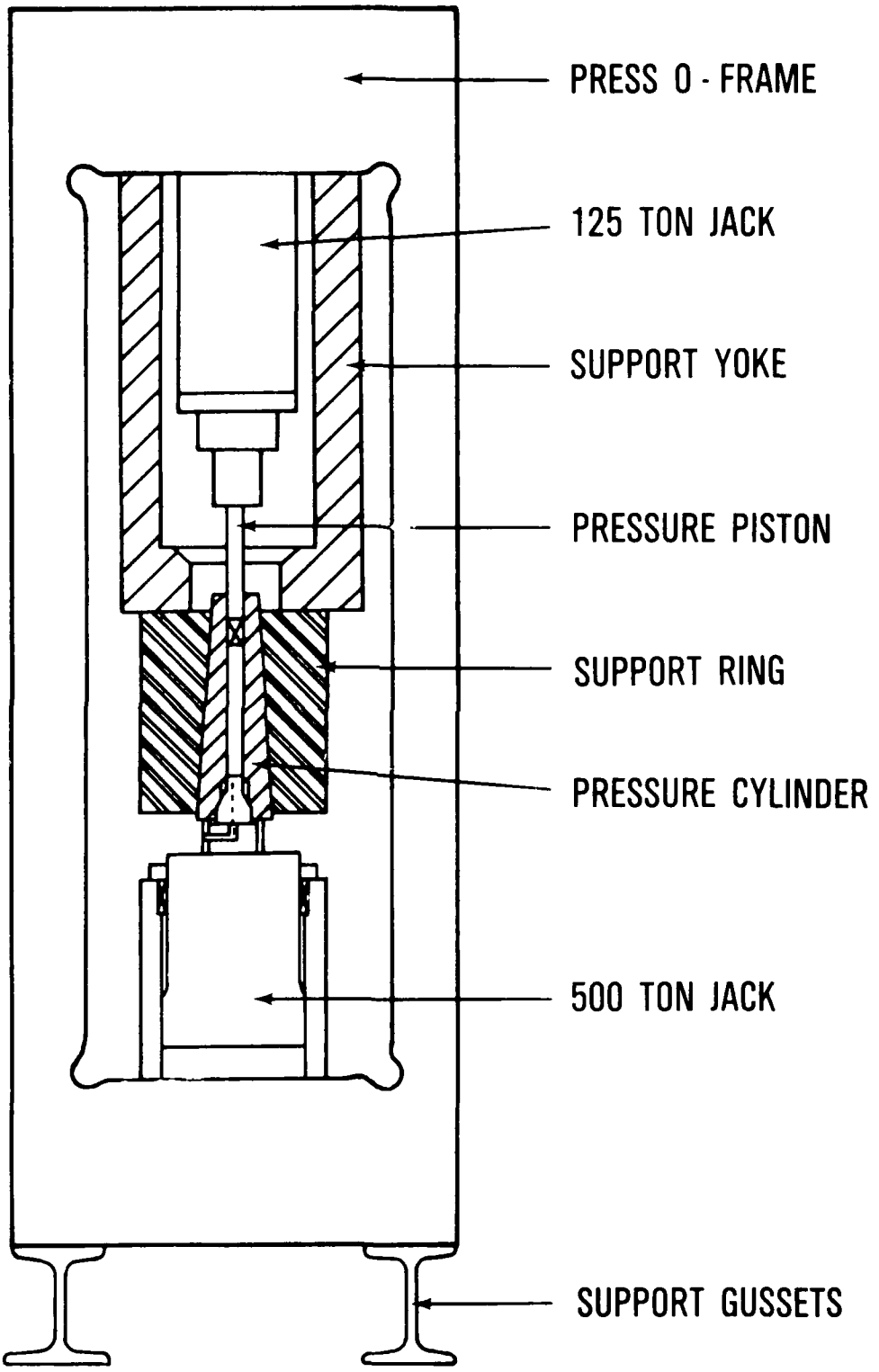
In-house use only

LOCATION:

BUILDING: 490 ROOM: 136

POINT OF CONTACT:

WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-7477
AV 785-7477



High Pressure Viscometer

FACILITY TYPE:
Lubricants

PURPOSE:
Examine lubricant property changes attributable to severely adverse environments

FACILITY NAME:
Lubricant Stability Analysis Facility

PRIMARY CAPABILITIES:
Expose lubricants to a variety of adverse operating conditions simulating actual engine and more severe environments

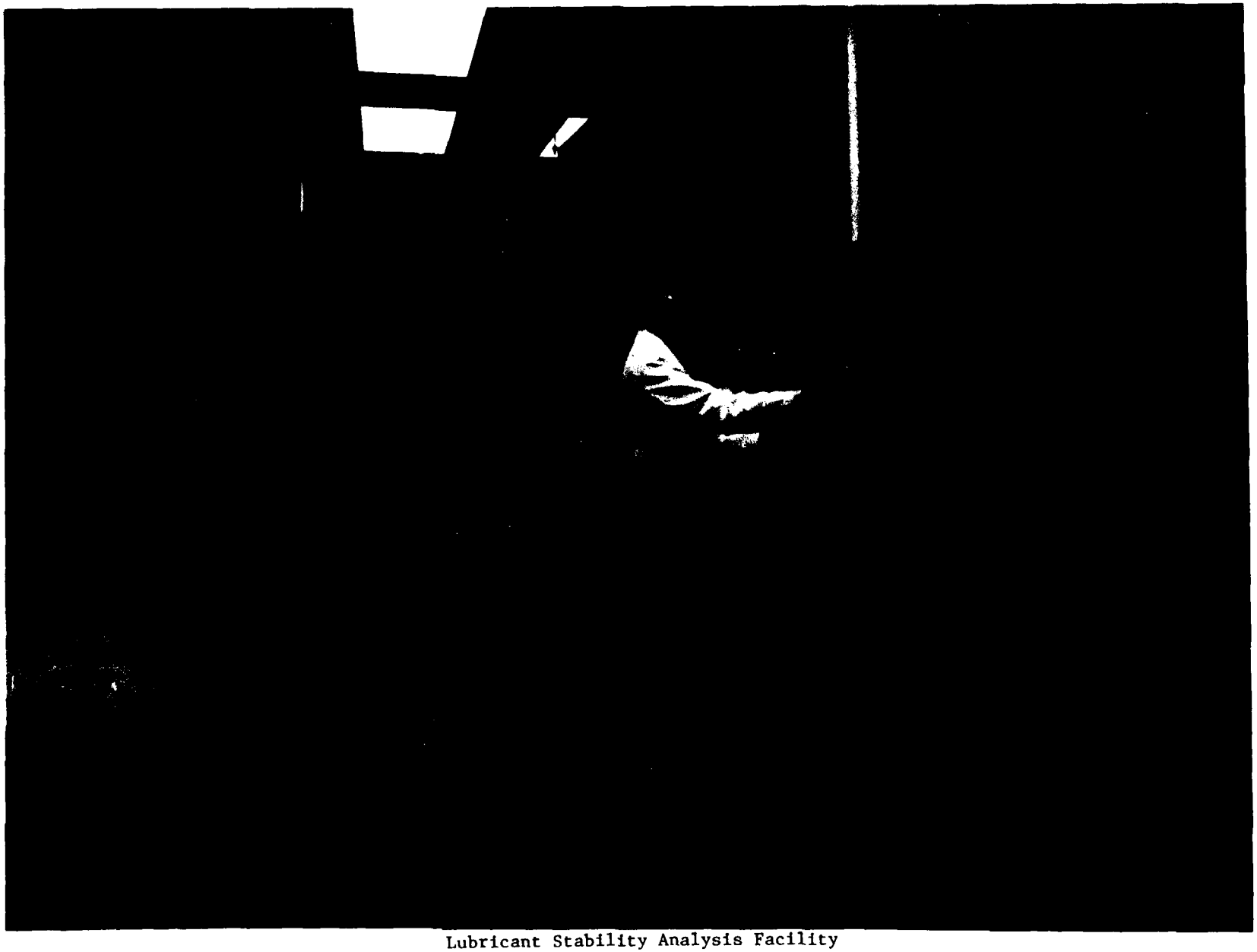
SPECIAL/UNIQUE CAPABILITIES:
Assess lubricant stability over wide range of conditions under a variety of extreme conditions

INSTRUMENTATION:
Static coker, oxidation-corrosion rig, micro-carbon residue tester, isothermal oxidation tester

AVAILABILITY:
In-house or on-site contractor use only

LOCATION:
BUILDING: 490 ROOM: 227

POINT OF CONTACT:
WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-4939
AV 785-4939



Lubricant Stability Analysis Facility

FACILITY TYPE:
Lubricants

PURPOSE:
Analyze basic lubricant properties

FACILITY NAME:
Lubricant Analysis Facility

PRIMARY CAPABILITIES:
Test for basic lubricant chemical and physical properties

SPECIAL/UNIQUE CAPABILITIES:
Viscosities may be determined at temperatures as low as -65 degF

INSTRUMENTATION:
Viscometers, pH meters, analytical balances, centrifuge, oil foaming test rig, microfiltration rig

AVAILABILITY:
In-house or on-site contractor use only

LOCATION:
BUILDING: 490 ROOM: 235

POINT OF CONTACT:
WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-4939
AV 785-4939

Lubricant Analysis Facility

FACILITY TYPE:
Lubricants

PURPOSE:
Visual and surface examination of solid lubricants and engine components

FACILITY NAME:
Microscopy Facility

PRIMARY CAPABILITIES:
High magnification examination and elemental analysis of surfaces

SPECIAL/UNIQUE CAPABILITIES:
Phase contrast; bichrometric and polarized light microscope

INSTRUMENTATION:
Scanning electron microscope with energy dispersive x-ray diffraction elemental detector

Bichromatic and polarizing light microscopes

AVAILABILITY:
In-house or on-site contractor use only

LOCATION:
BUILDING: 490 ROOM: 225

POINT OF CONTACT:
WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-4939
AV 785-4939

Microscopy Facility

FACILITY TYPE:
Lubricants

PURPOSE:
Analyze engine wear metal to determine wear mechanisms and engine condition

FACILITY NAME:
Ferrography Facility

PRIMARY CAPABILITIES:
Microscopic examination and identification of wear metals contained in used oil samples for engine condition monitoring

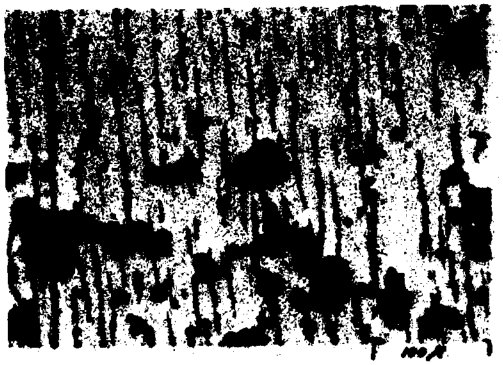
SPECIAL/UNIQUE CAPABILITIES:
Duplex ferrograph

INSTRUMENTATION:
Analytical ferrograph, direct reading ferrograph, ferroscope

AVAILABILITY:
In-house or on-site contractor use only

LOCATION:
BUILDING: 490 ROOM: 226

POINT OF CONTACT:
WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-4939
AV 785-4939



NON-WEAR PARTICLES

FERROGRAPHY

FACILITY TYPE:

Lubricants

PURPOSE:

Assess tribological characteristics of lubricants in rolling and sliding bearing contact

FACILITY NAME:

Lubricant Friction and Wear Testing Facility

PRIMARY CAPABILITIES:

Test liquid lubricant tribological properties

Provide typical load, speed, and temperature settings of 35 lbs, 1200 rpm, and 320 degC for wear testing

SPECIAL/UNIQUE CAPABILITIES:

Computer controlled; data acquisition by computer;instrumentation may be configured to simulate alternate loading conditions

INSTRUMENTATION:

Four-ball wear testers

AVAILABILITY:

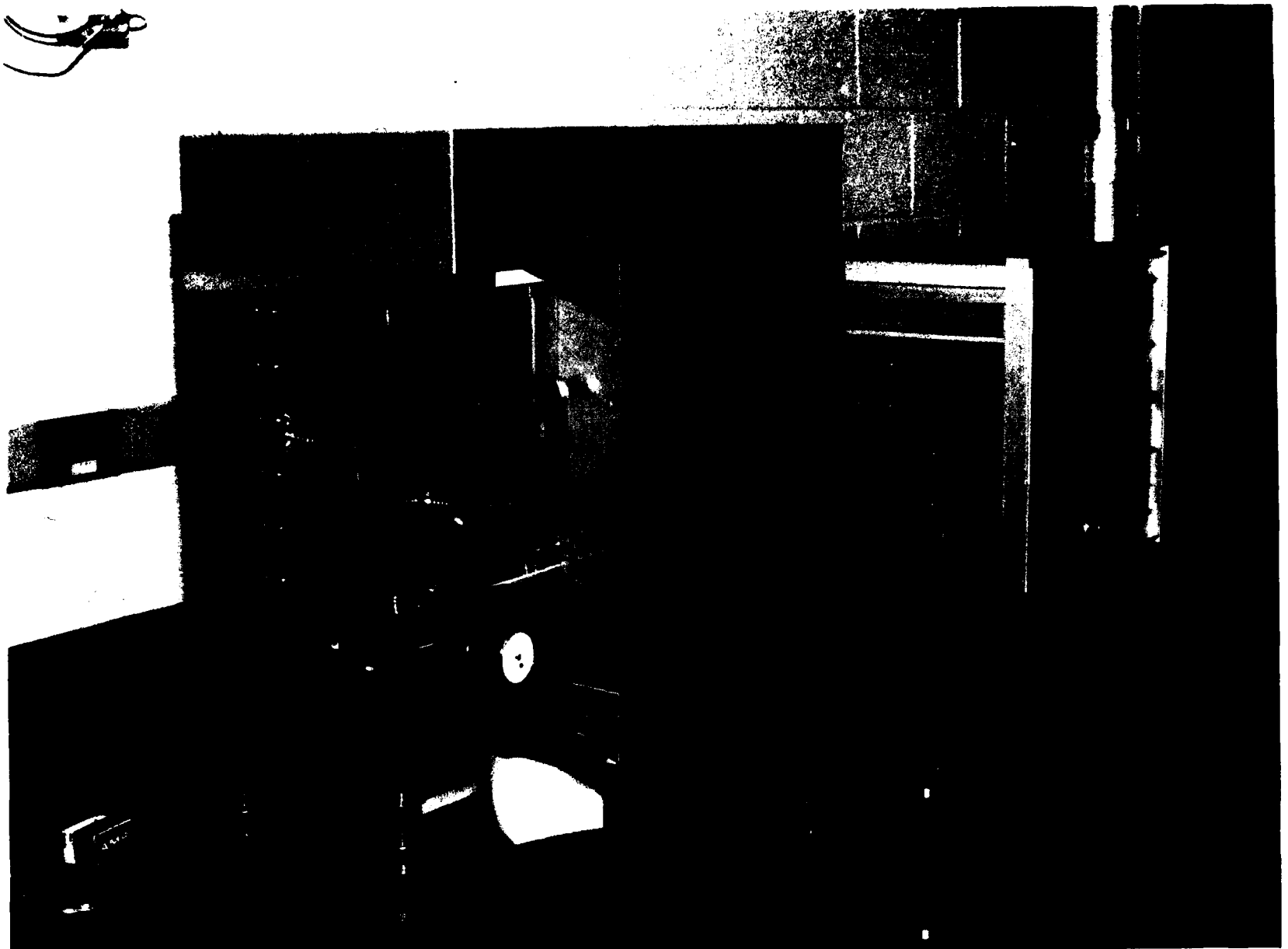
In-house or on-site contractor use only

LOCATION:

BUILDING: 490 ROOM: 234

POINT OF CONTACT:

WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-4939
AV 785-4939



Lubricant Friction and Wear Testing Facility

FACILITY TYPE:
Lubricants

PURPOSE:
Characterize thermal properties of solid and liquid lubricants

FACILITY NAME:
Thermal Analysis Facility

PRIMARY CAPABILITIES:
Characterize energy, dimension and mass changes of lubricants as a function of temperature and time

SPECIAL/UNIQUE CAPABILITIES:
Simultaneous thermal analysis possible

INSTRUMENTATION:
Differential scanning calorimetry, differential thermal analysis, thermogravimetric and thermomechanical analyses, mass analyzer

AVAILABILITY:
In-house or on-site contractor use only

LOCATION:
BUILDING: 490 ROOM: 231

POINT OF CONTACT:
WRDC/POSL
WPAFB, OH 45433-4939
(513) 255-4939
AV 785-4939

Thermal Analysis Facility

FACILITY TYPE:
Lubricants

PURPOSE:
Provide wide-ranging chemical characterization of both new and used lubricants

FACILITY NAME:
Lubricant Instrumental Analysis Facility

PRIMARY CAPABILITIES:
Analyze new and used lubricants for chemical characterization and determination of degradation mechanisms

SPECIAL/UNIQUE CAPABILITIES:
Coupled system for thermal degradation studies: high temperature furnace coupled to gas chromotograph with infrared and mass selective detectors

Characterize degradation mechanisms and products of high tempesrature lubricants

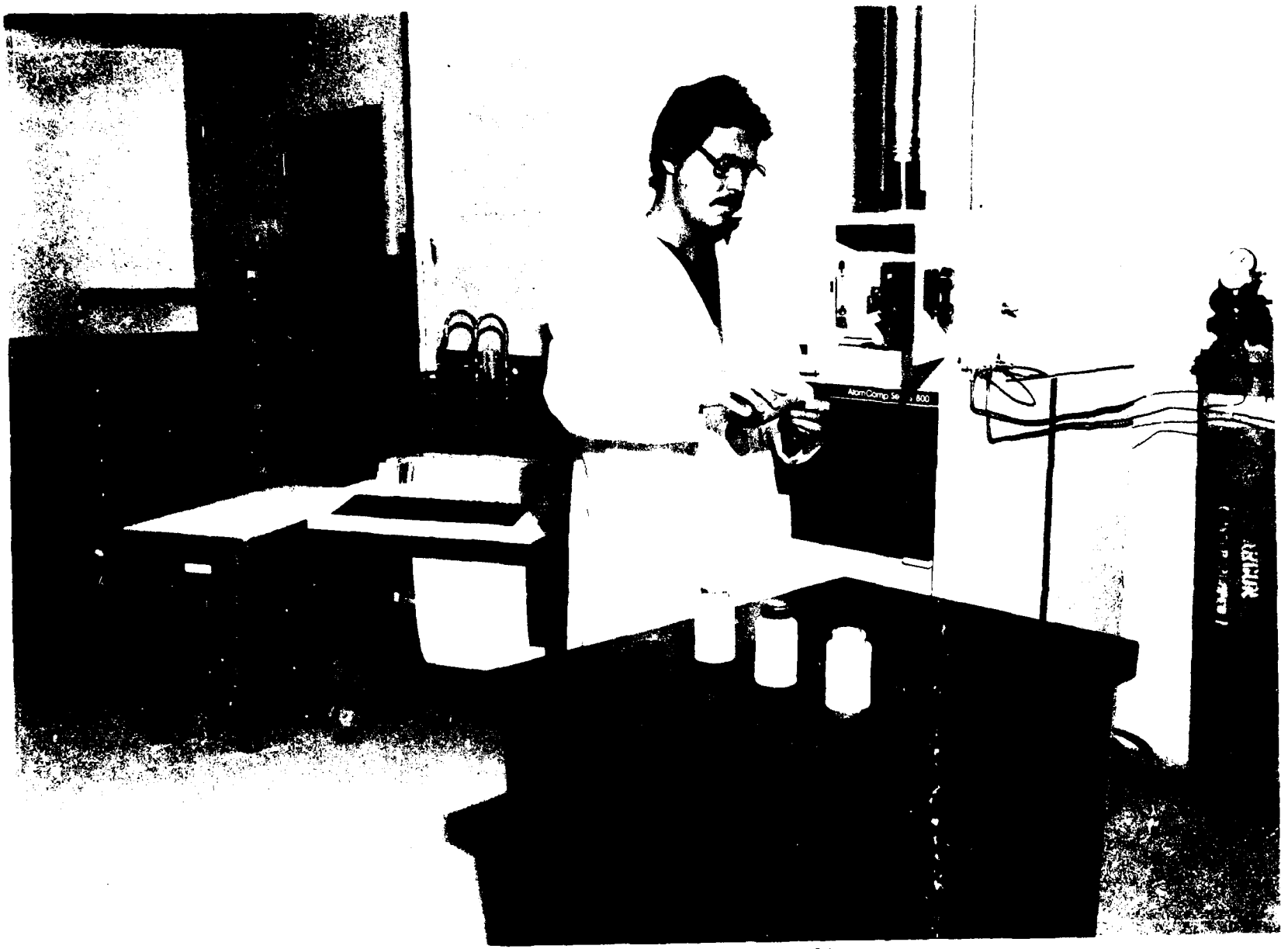
INSTRUMENTATION:
Gas and liquid chromatographs

Infrared, fluorescence, atomic absorption, atomic emission, and mass spectrometers

AVAILABILITY:
FY 90; in-house or on-site contractor use only

LOCATION:
BUILDING: 490 ROOM: 235

POINT OF CONTACT:
WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-4939
AV 785-4939



Lubricant Instrumental Analysis Facility

FACILITY TYPE:
Lubricants

PURPOSE:
Evaluate final phases of experimental lubricants for turbine engine applications

FACILITY NAME:
T63 Engine Test Stand

PRIMARY CAPABILITIES:
Evaluate candidate lubricants for possible qualification to existing military specifications

Evaluate experimental oils for advanced turbine engine concepts

SPECIAL/UNIQUE CAPABILITIES:
T63-A5A turboshaft engine

Waterbrake type dynomometer to simulate the load (about 350 hp) on the engine

INSTRUMENTATION:
Automated data acquisition system capable of obtaining data from 20 I/C and 5 CR/A1 thermocouples

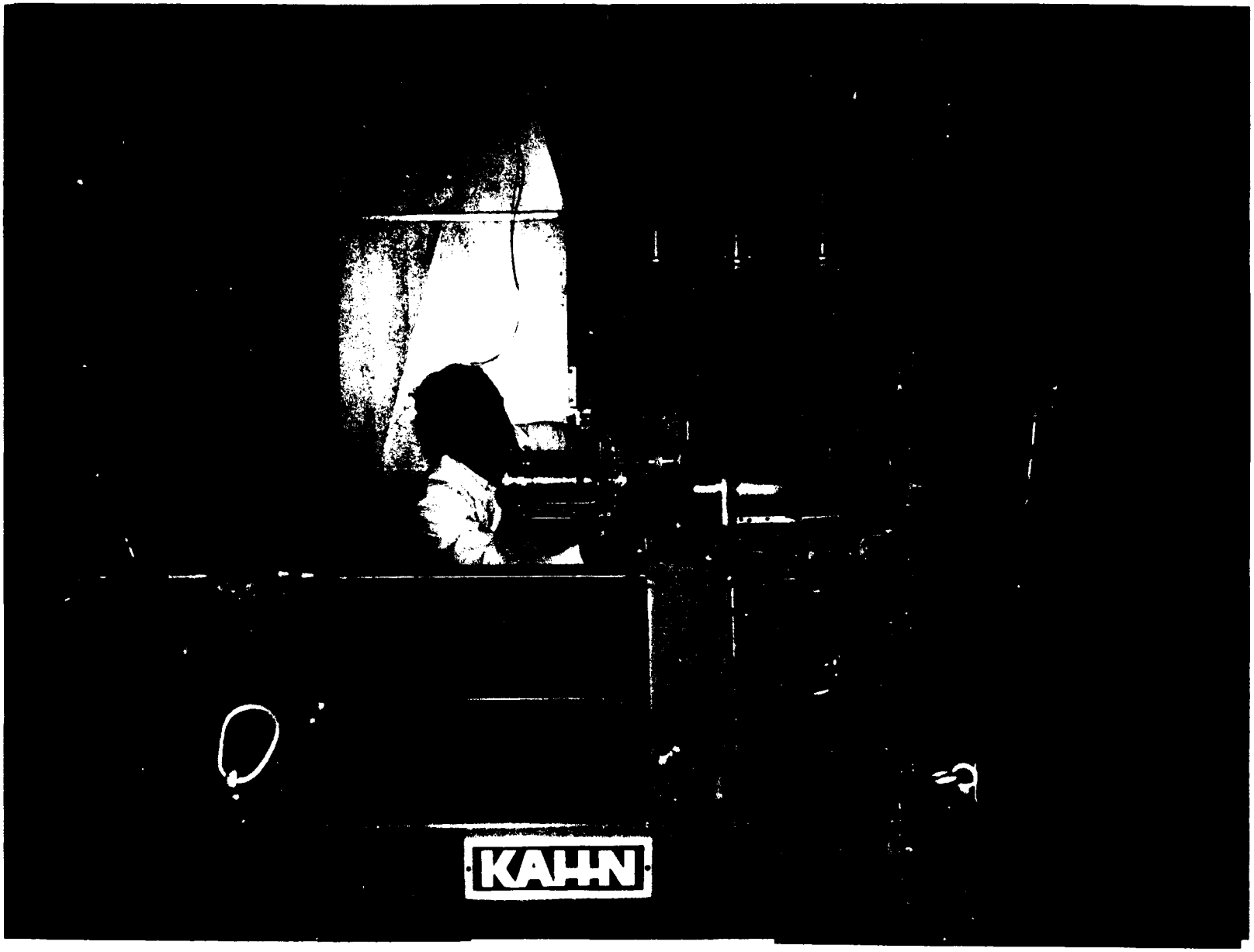
20 pressure transducers, 3 shaft speed tachometers, 5 fuel, oil and water flowmeters

5 vibration pickups, 1 torquemeter

AVAILABILITY:
FY90, in-house or on-site contractor use only

LOCATION:
BUILDING: 490 ROOM: 146

POINT OF CONTACT:
WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-7477
AV 785-7477



T63 Engine Test Stand

FACILITY TYPE:

Lubricants

PURPOSE:

Evaluate experimental lubricants for turbine engine applications

FACILITY NAME:

J57 Engine Simulator

PRIMARY CAPABILITIES:

Evaluate thermal and oxidative stress, in a simulated engine environment, of candidate high temperature lubricants for qualification to existing military specs

Evaluate experimental oils for advanced turbine engine concepts

SPECIAL/UNIQUE CAPABILITIES:

Simulator constructed utilizing numbers 4-5 bearing/seal compartments of a Dash 59 Series J57 engine

System driven through accessory drive gearbox and heated electrically

Run cycle used is equivalent to full-scale J57 engine test

INSTRUMENTATION:

Fully automated facility; hands free operation

Cycle control and data acquisition computer managed

Data analysis and report printing by computer

AVAILABILITY:

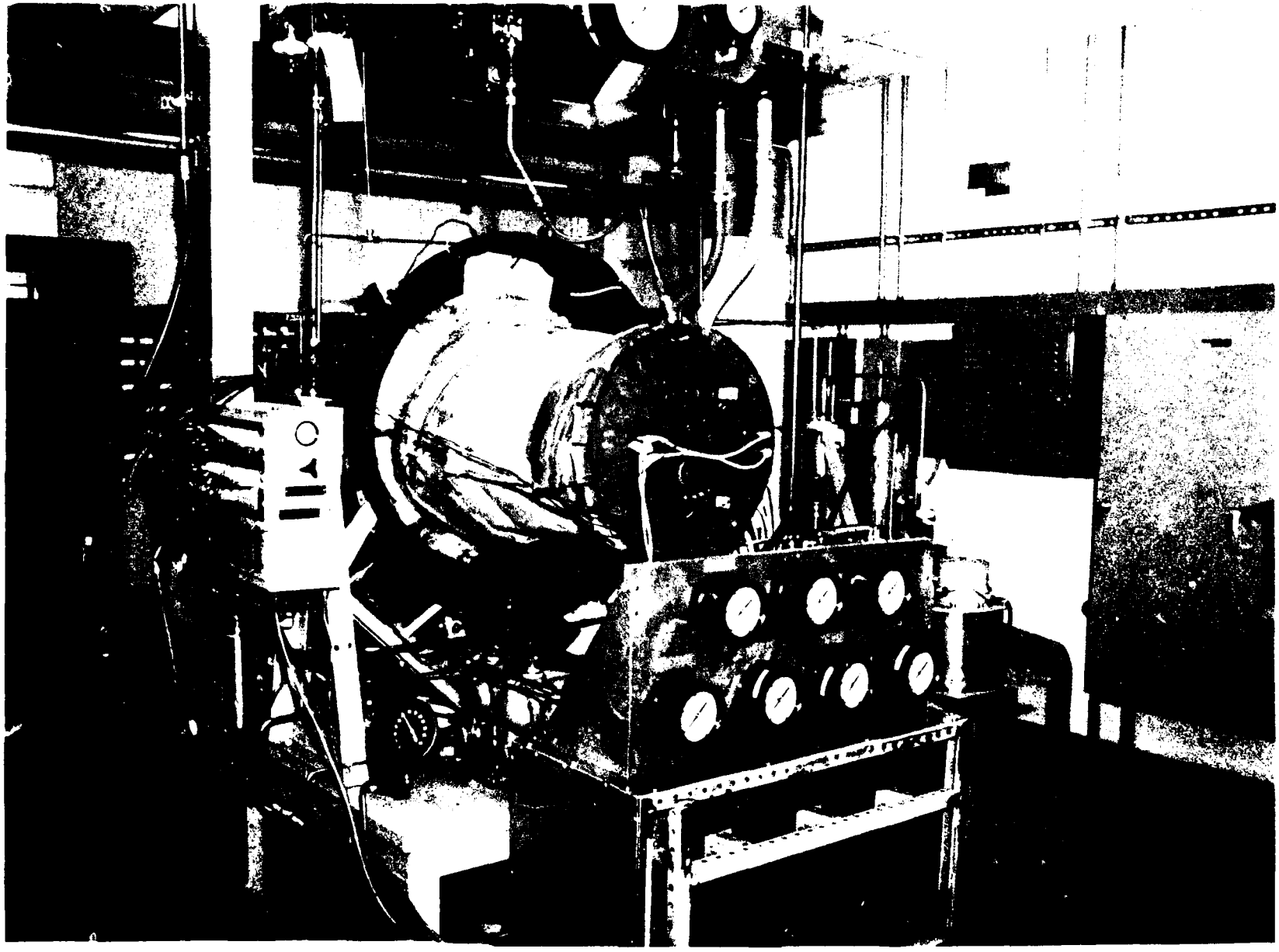
In-house or on-site contractor use only

LOCATION:

BUILDING: 490 ROOM: 131

POINT OF CONTACT:

WRDC/POSL
WPAFB, OH 45433-6563
(513) 255-7463
AV 785-7463



J57 Engine Simulator

FACILITY TYPE:
Turbine Engines

PURPOSE:
Provide analytical and physical research and test capabilities to develop turbine component technology

FACILITY NAME:
Turbine Research Laboratory

PRIMARY CAPABILITIES:
Turbine Aero/Thermal Basic Research Facility focuses attention on turbulence effects on turbine heat transfer and film cooling; rig test cell 21

Advanced Turbine Aerothermal Research Rig (ATARR) for heat transfer and aerodynamic research and performance measurement on full-scale turbines

ATARR will simulate all relevant engine conditions governing turbine performance

ATARR will incorporate unique nonintrusive instrumentation systems to measure surface heat transfer, velocity and temperature within turbine blade passages

SPECIAL/UNIQUE CAPABILITIES:
Basic Research:ability to take aero/thermal data with/without blowing at turbulence levels of 5 to 25% in a 1-D flow field

ATARR:low cost short duration operation, integrated aero and heat transfer testing in 3-D rotating environment

Basic Research: building 18C, room 21: ATARR: building 71, J-Bay

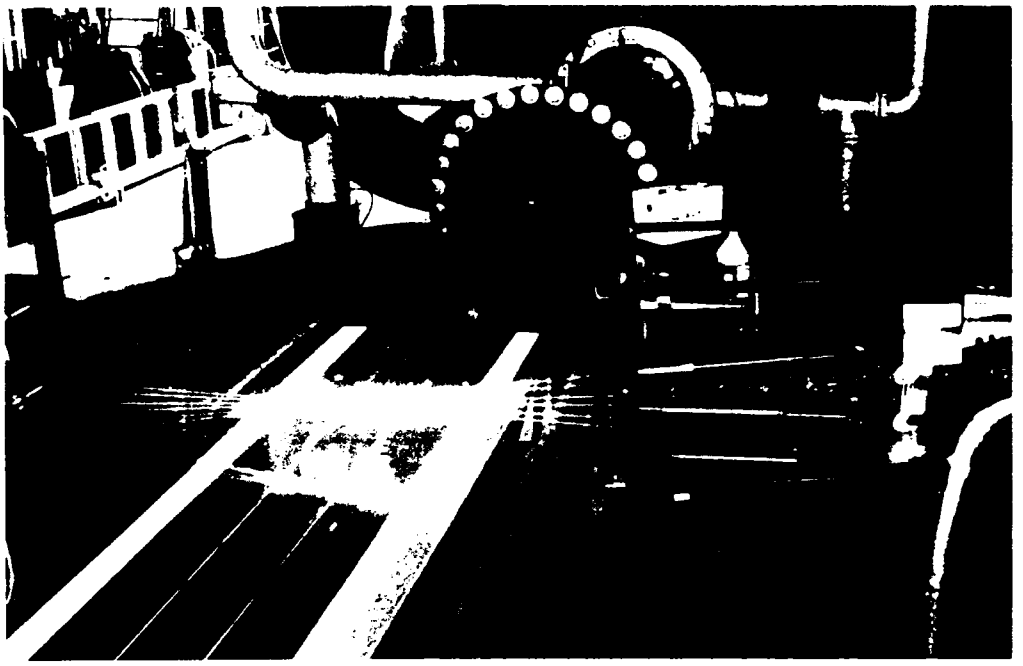
INSTRUMENTATION:
Laser 2 focus velocimeter, 3 component off axis laser doppler velocimeter, 8 channel hot wire aneomometer

High frequency on-surface heat flux sensors, non-intrusives field measurements of inpassage velocity

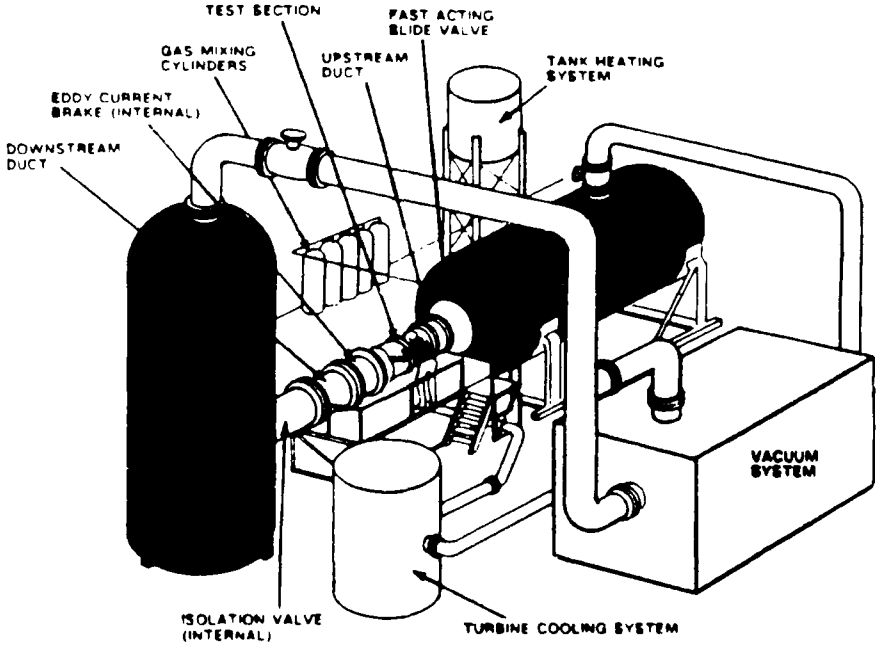
AVAILABILITY:
Primarily in-house research; limited use by Government contractors

LOCATION:
BUILDING: ROOM:

POINT OF CONTACT:
WRDC/POTC
WPAFB, OH 45433-6563
(513) 255-4830
AV 785-4830



a. Turbine Aero/Thermal Basic Research Facility



b. Advanced Turbine Aerothermal Research Rig

Turbine Research Laboratory

FACILITY TYPE:
Turbine Engine

PURPOSE:
Research advanced fan and compressor concepts

FACILITY NAME:
Compressor Test Facility

PRIMARY CAPABILITIES:
2000 hp, 6,000 to 21,500 RPM

Air flow 20 to 60 lbs/sec

14 to 19 inch rotor tip diameter

6 to 15 psia inlet total pressure

SPECIAL/UNIQUE CAPABILITIES:
Two identical compressor main frames composed of bearings, seals, driveshaft, support structure and exhaust duct

INSTRUMENTATION:
160 channels steady state pressure measurement, 150 channels steady state temperature measurement

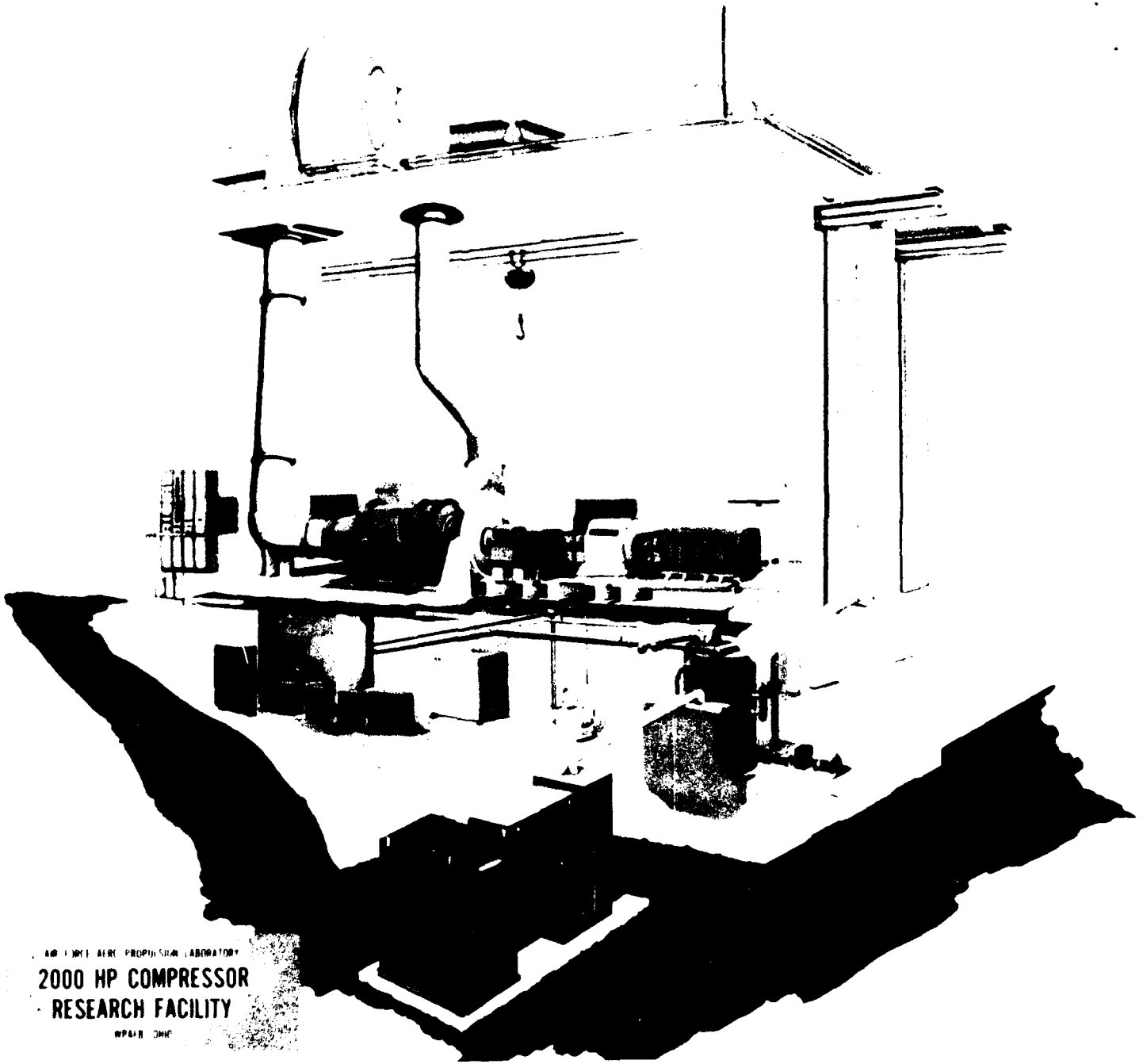
12 channels high frequency unsteady pressure, 10 channels dynamic strain, rotating components

20 channels dynamic strain, stationary components, 8 channels rotor tip clearance measurement

AVAILABILITY:
Supports AFOSR 6.1 programs

LOCATION:
BUILDING: 450 ROOM:

POINT OF CONTACT:
WRDC/POTX
WPAFB, OH 45433-6563
(513) 255-7163
AV 785-7163


AIR FORCE AERO PROPULSION LABORATORY
2000 HP COMPRESSOR
RESEARCH FACILITY

FACILITY TYPE:

Turbine Engine

PURPOSE:

Conduct exploratory and advanced development tests of full-scale, multi-stage, single-speed fans and compressors

FACILITY NAME:

Compressor Research Facility

PRIMARY CAPABILITIES:

Speed/Range: 3,000 to 16,000 RPM at 30,000 hp; 16,000 to 30,000 RPM at 15,000hp

Air flow rate: 15-500 lbs/sec; inlet pressure range: 2 psia-ambient

Discharge pressure range: up to 588 psia; discharge temperature range: up to 1490 degF

SPECIAL/UNIQUE CAPABILITIES:

Steady-state and transient phenomena on full-size test articles under operating conditions simular to actual flight profiles

Dual discharge, laser anemometry, on-line graphics, automatic strain gage monitoring

INSTRUMENTATION:

Facility automated and computer controlled

Data acquisition rates of 100,000 samples/sec

608 channels steady-state data; 240 channels analog data; transient data rate-700 samples/sec for 77 channels

AVAILABILITY:

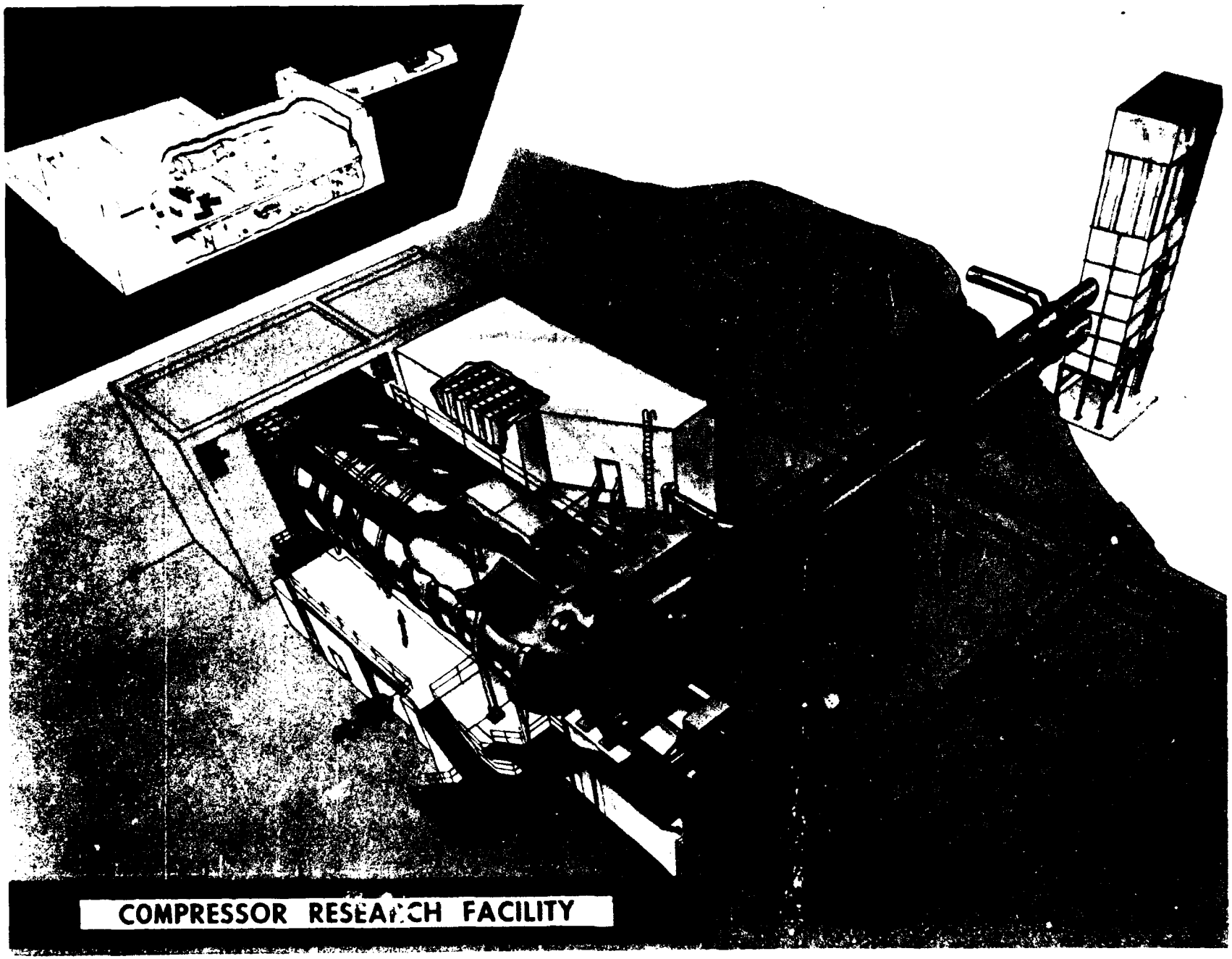
Available for both military and commercial fan/compressor testing

LOCATION:

BUILDING: 71B ROOM:

POINT OF CONTACT:

WRDC/POTX
WPAFB, OH 45433-6563
(513) 255-8210
AV 785-8210



COMPRESSOR RESEARCH FACILITY

FACILITY TYPE:
Turbine Engine

PURPOSE:
Support compressor research test programs

FACILITY NAME:
Compressor Research Facility Component Test and Structures Laboratory

PRIMARY CAPABILITIES:
Flow facility for calibration of inlets and probes

Low speed compression system studies

Holographic interferometry on compressor blades, vanes, and instrumentation probes

SPECIAL/UNIQUE CAPABILITIES:
Development of both laser transit and laser Doppler anemometery systems

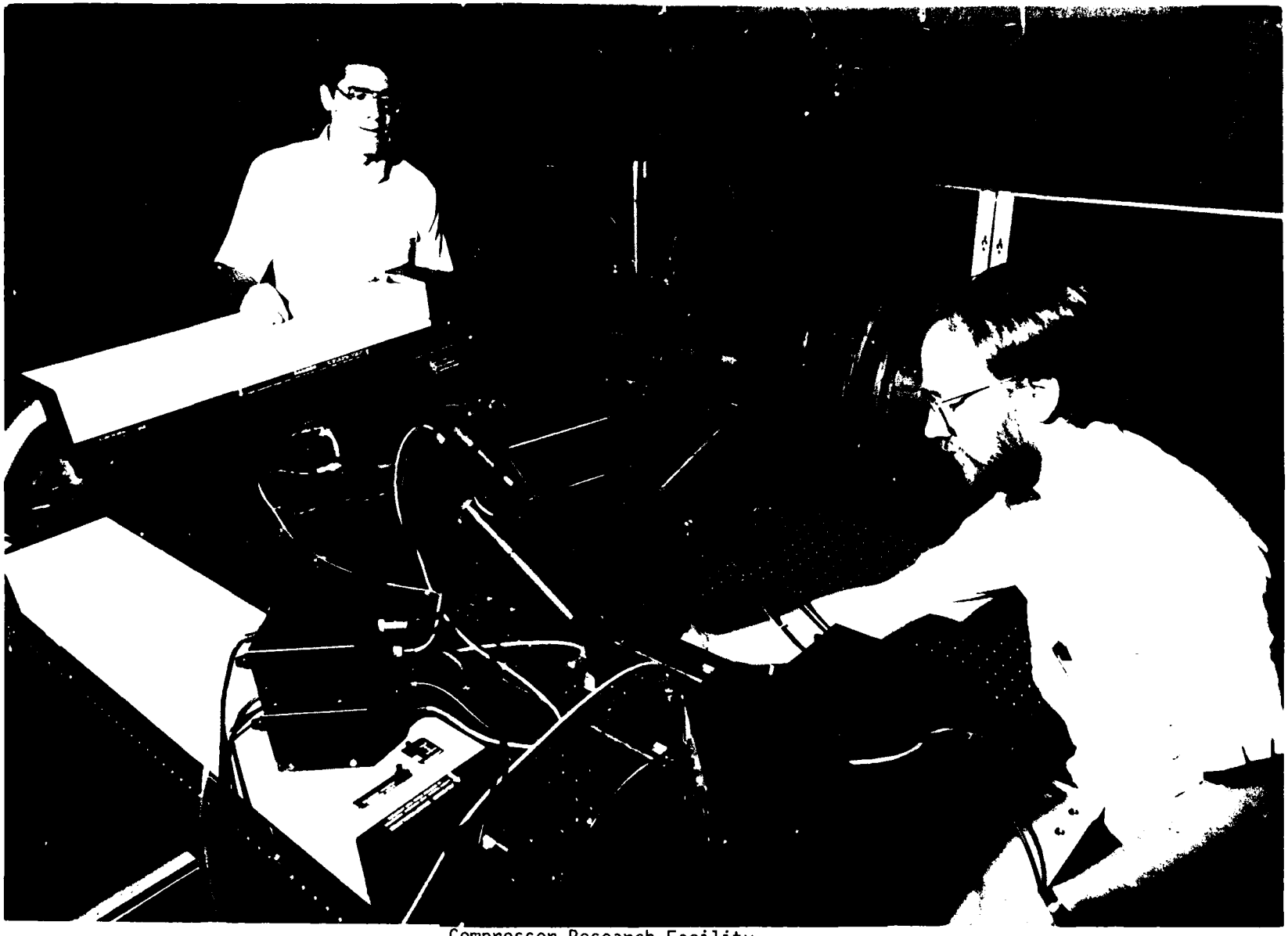
Spectral analysis through thermal emmissions (SPATE)

INSTRUMENTATION:
Argon laser, optical devices

AVAILABILITY:
Supports compressor tests and other Air Force agencies

LOCATION:
BUILDING: 18 ROOM: 24

POINT OF CONTACT:
WRDC/POTX
WPAFB, OH 45433
(513) 255-8210
AV 785-8210



Compressor Research Facility
Component Test and Structures Laboratory

ELECTRONIC TECHNOLOGY LABORATORY

FACILITY TYPE:

Microelectronics

PURPOSE:

Design, fabricate and test microelectronic devices, integrated circuits and maintain a state-of-the-art computer aided design and simulation facility

FACILITY NAME:

Microelectronics Testing and Computer Aided Design Facility

PRIMARY CAPABILITIES:

Development of GaAs-based heterojunction field effect transistors for application in complementary logic implementations

Investigation of novel logic architectures based on integrated field effecttransistors and resonant tunneling devices

High speed testing of devices/circuits and analog to digital converters

Evaluation of advanced design tools developed under contractual efforts

SPECIAL/UNIQUE CAPABILITIES:

Automated wafer parametric testing; automated analog-to-digital converter testing

Electro-optic non-invasive testing of high speed devices and ICs

Full computer aided design capability

INSTRUMENTATION:

HP 4085A Switching Matrix; Electroglass 2001X Automatic Prober

HP 4145A Parameter Analyzer; HP 4192A Impedance Analyzer

General purpose microelectronic test equipment

AVAILABILITY:

Primarily in-house research

LOCATION:

BUILDING: 620 ROOM: S2W37

POINT OF CONTACT:

WRDC/ELE
WPAFB, OH 45433-6543
(513) 255-7142
AV 785-7142

Microelectronics Testing and Computer Aided Design Facility

FACILITY TYPE:

Microwave/Millimeter Wave

PURPOSE:

Design, fabricate and/or test microwave and millimeter wave electronic components and integrated circuits

FACILITY NAME:

Microwave/Millimeter Wave Laboratory

PRIMARY CAPABILITIES:

Design and fabricate solid state devices and integrated circuits operating in the 0.1 to 100 GHz range involving III/V compound semiconductor materials

Device correlation analysis; microwave device/process modeling; GaAs/Si material evaluation

Design, fabrication and testing of GaAs MMICs; testing of general microwave/millimeter wave components

SPECIAL/UNIQUE CAPABILITIES:

RF on-wafer testing of MMICs using a cascade automatic prober and HP 8510 Vector network analyzer

Overstress testing of microwave devices and MMICs

INSTRUMENTATION:

PMI Scalar network analyzer (1-40 GHz); HP 8510 Vector network analyzer (0.1-26 GHz); Cascade on-wafer RF prober

Semi-automatic millimeter wave Vector network analyzers (33-50 GHz and 50-70 GHz)

General purpose microwave/millimeter wave test equipment

AVAILABILITY:

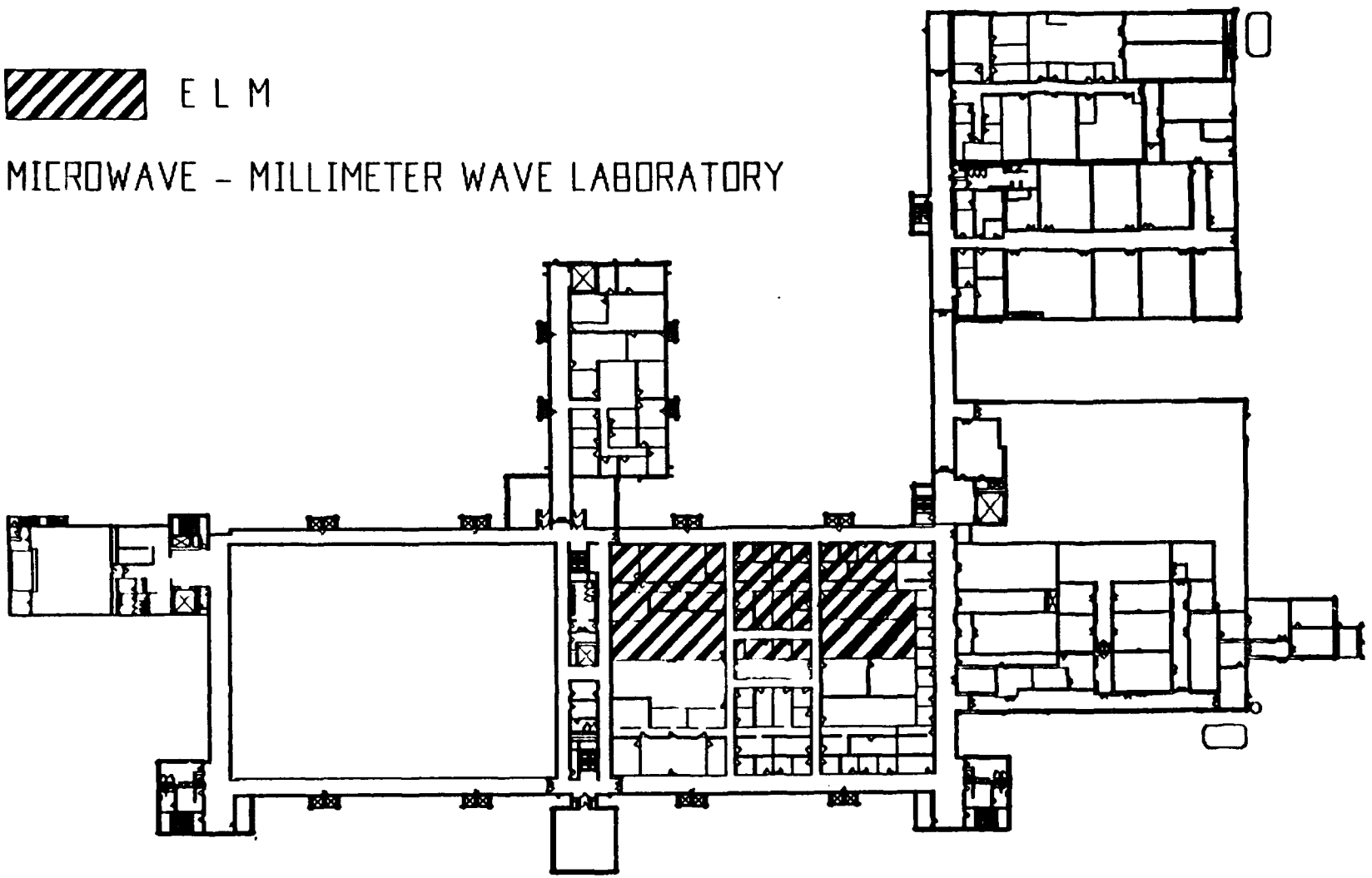
Primarily in-house research

LOCATION:

BUILDING: 620 ROOM: S2A38

POINT OF CONTACT:

WRDC/ELM
WPAFB, OH 45433-6543
(513) 255-4831
AV 785-4831


E L M
MICROWAVE - MILLIMETER WAVE LABORATORY

FACILITY TYPE:
Coherent and Non-coherent Optics

PURPOSE:
Exploratory development of lasers, light processing and control devices, detectors, focal plane arrays

FACILITY NAME:
Electro-Optics Division Research Facilities

PRIMARY CAPABILITIES:
Characterization and evaluation of laser materials

Characterization and evaluation of non-linear optical materials

Optical surface scatterometry; optical logic and processing evaluation facility

Optical Fourier transform measurement facility

SPECIAL/UNIQUE CAPABILITIES:
Optical excitation spectroscopy of laser materials from 4 degK through elevated temperatures

Absorption, transmission and fluorescence spectroscopy from UV through long-wavelength infrared

Interferometric and surface analysis of thin film optical waveguides

INSTRUMENTATION:
Multiple spectrometers and spectrophotometers; laser sources from visible through 10.6 micrometers

Optical parametric oscillator testbed for mid-infrared

Bidirectional reflectance distribution function measurement instrumentation for 4 inch surfaces and 3 visible wavelengths; Zygo surface interferometer

AVAILABILITY:
Primarily in-house research

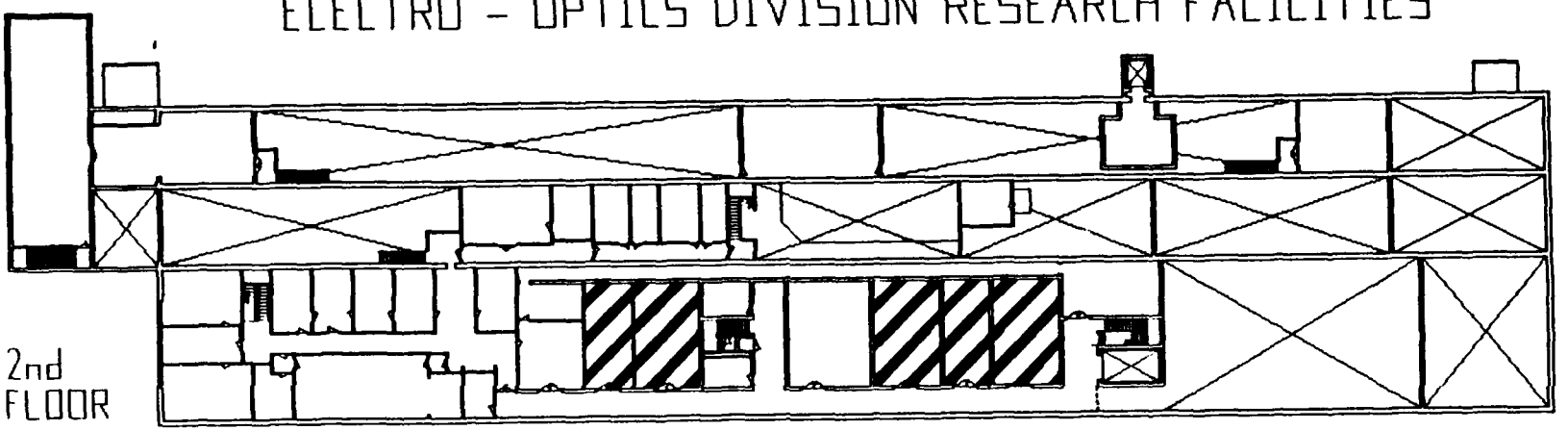
Cooperative experiments with other Government agencies and universities

LOCATION:
BUILDING: 22B ROOM: C210

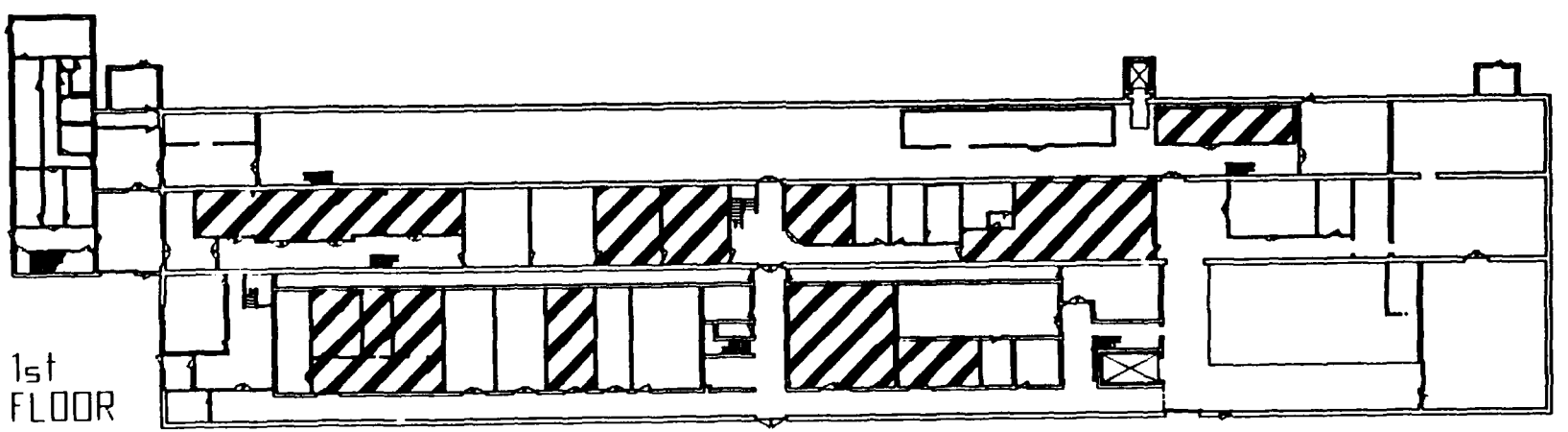
POINT OF CONTACT:
WRDC/ELO
WPAFB, OH 45433-6543
(513) 255-3086
AV 785-3086

E L O

ELECTRO - OPTICS DIVISION RESEARCH FACILITIES



2nd FLOOR



1st FLOOR

FACILITY TYPE:

Device and Semiconductor Research

PURPOSE:

Research on compound semiconductors and semiconductor structures, advanced microwave, high speed digital and novel electro-optic devices

FACILITY NAME:

Device Research Laboratory

PRIMARY CAPABILITIES:

Development of new molecular beam epitaxial growth techniques for III-V compounds and heterostructures

Theoretical and experimental research on III-V semiconductor structures and devices; development of advanced electronic and electro-optical devices

Extensive theoretical and experimental characterization of electronic and optical properties of III-V materials and devices

SPECIAL/UNIQUE CAPABILITIES:

Epitaxial materials growth; ion implantation; metal and dielectric deposition; reactive ion etching; nanometer lithography; modeling of device physics

Conventional and rapid thermal annealing; scanning electron microscopy and electrical testing

INSTRUMENTATION:

JEOL 5 DIIA e-beam; Varian 360 and GEN II MBE; full complement of conventional semiconductor process equipment

Time resolved high resolution photoluminescence; photoreflectance; Hall measurement apparatus

AVAILABILITY:

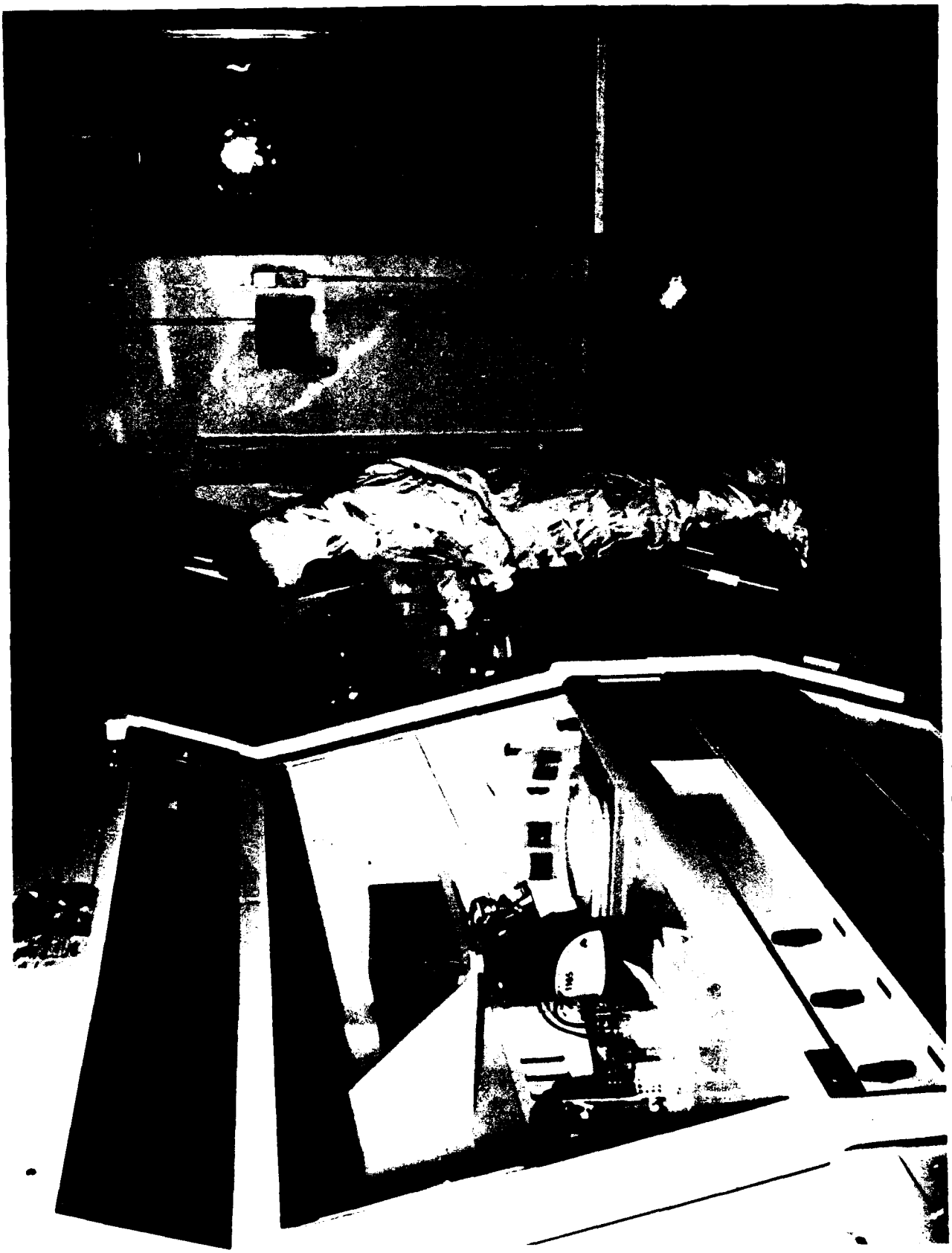
Primarily in-house research

LOCATION:

BUILDING: 620 ROOM: NE2G4

POINT OF CONTACT:

WRDC/ELR
WPAFB, OH 45433-6543
(513) 255-6871
AV 785-6871



Device Research Laboratory


AVIONICS LABORATORY

FACILITY TYPE:

Embedded Software

PURPOSE:

Develop, test and evaluate new technologies designed to improve AFLC support capability for embedded system software

FACILITY NAME:

Embedded Computer Resources Support Improvement Facility (ESIP Lab)

PRIMARY CAPABILITIES:

Ada in embedded, distributed, integrated systems; software models, real-time simulation

Avionics integration support environments, embedded computer emulation, real-time networks

Software performance monitoring, test methodology and test criteria

Identification, development and evaluation of embedded software support technologies.

SPECIAL/UNIQUE CAPABILITIES:

F-16, F-111, and A-10 displays

F-16 Fire Control Computer Support Environment

INSTRUMENTATION:

Special purpose support hardware and software, actual embedded computers and controls, graphics equipment

MicroVAX(s), Transputers, Intel 80386(s), MIL-STD-1750A(s), Motorola 68020(s),National 32532(s)

AVAILABILITY:

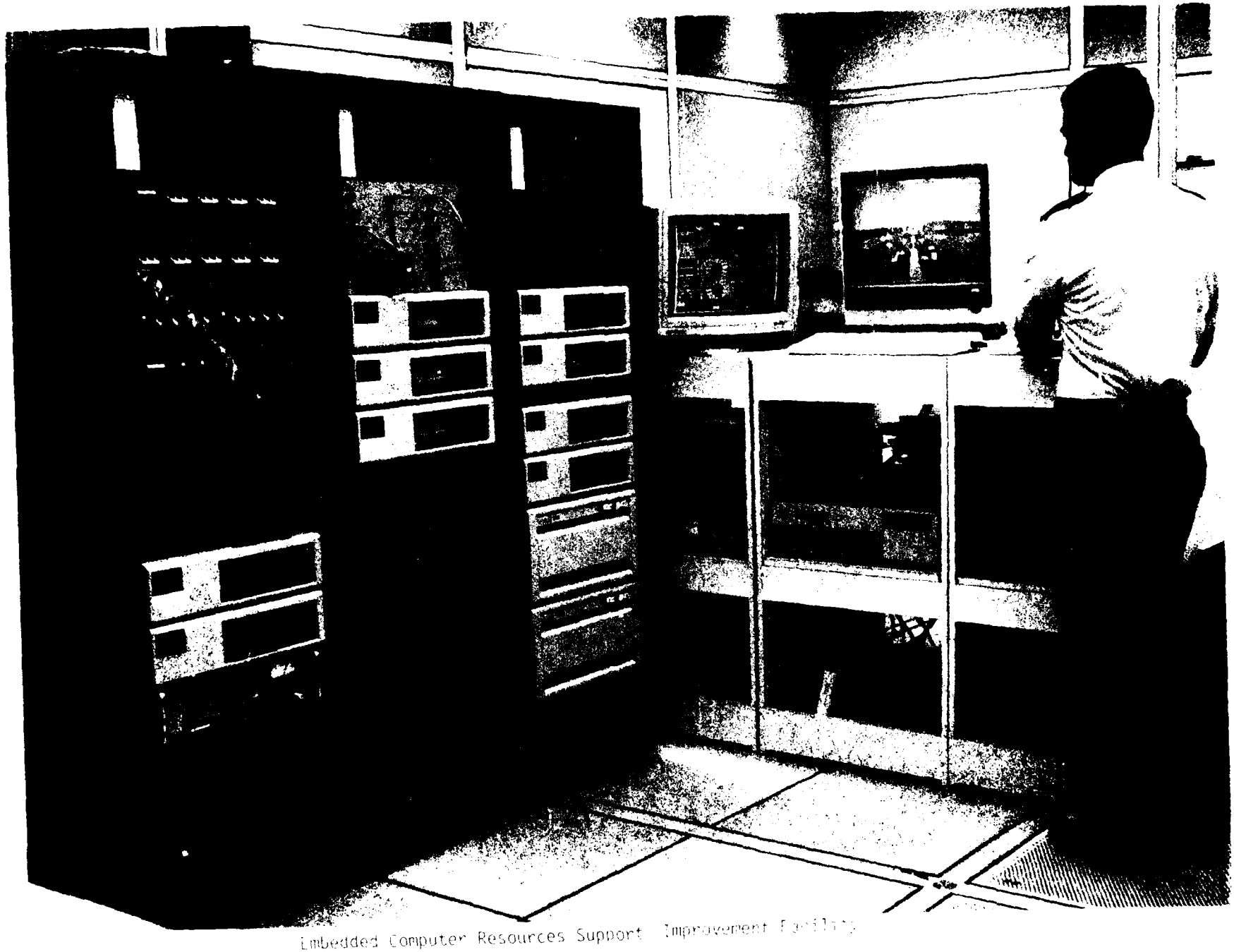
To ALC's on joint efforts with AAAF on non-interference basis

LOCATION:

BUILDING: 620 ROOM: 3rd FL

POINT OF CONTACT:

WRDC/AAAF
WPAFB, OH 45433-6543
(513) 255-3826
AV 785-3826



Embedded Computer Resources Support Improvement Facility

FACILITY TYPE:
Communication

PURPOSE:
Research, development, and evaluation of Low Probability of Intercept (LPI) and Low Probability of Exploitation (LPE) communication systems

FACILITY NAME:
Communication Systems Evaluation Laboratory (CSEL)

PRIMARY CAPABILITIES:
Computer controlled generation of threat and interference signals to provide realistic background and jamming signal environments for dynamic evaluation

Provide dynamic evaluation of state-of-the-art CNI systems in the Integrated Electromagnetic System Simulator (IESS)

SPECIAL/UNIQUE CAPABILITIES:
Avionics Communication System Simulator (ACSS) hardware is a 6 channel transmitter which provides computer controlled signal generation in the HF, VHF, UHF and

L-band frequency bands; Has a wide variety of RF modulation capabilities including Am, FM, OOK, BPSK, QPSK, MSK, FSK, and frequency hopping (up to 20,000 h/s)

INSTRUMENTATION:
User Defined Operations and Interactive Test (UDOIT) software allows interactive control with equipment listed above

Can create custom test and evaluation scenarios which can be saved and precisely repeated at later date

UDOIT software also provides user with the capability for automated data collection

AVAILABILITY:

LOCATION:
BUILDING: 620 ROOM:

POINT OF CONTACT:
WRDC/AAAI
WPAFB, OH 45433-6543
(513) 255-2766
AV 785-2766


COMMUNICATION SYSTEMS
EVALUATION LABORATORY

FACILITY TYPE:
Communication

PURPOSE:
Research testing of advanced Integrated Communication Navigation and Identification Avionic (ICNIA) system

FACILITY NAME:
Integrated Electromagnetic System Simulator (IESS)

PRIMARY CAPABILITIES:
Real time dynamic testing of integrated avionic systems in realistic operational scenarios

Simultaneously generates a variety of CNI waveforms: Global Positioning System, Tactical Air Navigation, Microwave Landing System, Instrument Landing System

Also Single Channel Ground and Air Radio System, Joint Tactical Information Distribution System, Have-Quick

Also HF, VHF, and UHF Narrowband Communications, and Mark XII Identification Friend or Foe

SPECIAL/UNIQUE CAPABILITIES:
Only simulator avialable to test integrated avionic system in groundbased coordinated scenario situation at the sensor level

TEMPEST qualified facility

INSTRUMENTATION:
Simulators for above waveforms, MIL-STD-1553B and IEEE-488 interface to Unit Under Test (UUT)

Oracle database management system for data analysis

AVAILABILITY:
Primarily in-house

LOCATION:
BUILDING: 620 ROOM:

POINT OF CONTACT:
WRDC/AAAI
WPAFB, OH 45433-6543
(513) 255-2766
AV 785-2766

Integrated Electromagnetic System Simulator

FACILITY TYPE:
Laser communications

PURPOSE:
Research, development and testing of ground, airborne, and space based laser communications systems

FACILITY NAME:
Laser Communications Laboratory

PRIMARY CAPABILITIES:
Atmospheric Turbulence, LASER Characterization, Spectral Characterization of Transparent Materials and System Reliability testing

Lasercom link as an adaptive system

SPECIAL/UNIQUE CAPABILITIES:
Real-time measurement of atmospheric conditions to include temperature, pressure, humidity, and diffraction-limited aperture of the atmosphere

Eight inch telescope interfaced with optical detection equipment and MicroVAX for use as a generic optical antenna/receiver in lasercom link analysis system

Optical wavefront/coherence analysis system interfaced with MicroVAX for laser beam wavefront characterization

INSTRUMENTATION:
EGG-555 Spectral radiometer capable of wavelength measurements(UV through IR), Photodyne Radiometer, Optical wavefront/coherence analysis system

Eight inch telescope, MicroVAX workstation interfaced with IEEE-488 Data Bus for use as data aquisition equipment

Software for design/analysis of optical systems: Evaluating laser hazards, evaluation/simulation of atmospheric modeling

AVAILABILITY:
Primarily In-House, available to government agencies within DOD

LOCATION:
BUILDING: 620 ROOM: 12thFL

POINT OF CONTACT:
WRDC/AAAI
WPAFB, OH 45433-6543
(513) 255-3455
AV 785-3455

Laser Communications Laboratory

FACILITY TYPE:
Airborne Satellite Communications Testbed

PURPOSE:
Simulate, test and evaluate experimental satellite communications equipment and systems.

FACILITY NAME:
Satellite Communications Facility

PRIMARY CAPABILITIES:
Transmits to, and receives communications traffic from, satellites

Dependence on link performance on aircraft dynamics, propagation, altitude, antenna tracking mode and timing accuracy

On-orbit satellite anomalies

Terminal/satellite/network protocols, satellite commanding procedures, antenna aquisition and tracking algorithms, coding/interleaving options

SPECIAL/UNIQUE CAPABILITIES:
C-135/372 test bed can be modified to collect data from special shuttle packages/experiments

Measures satellite range, satellite antenna nulling algorithms , uplink/downlink beam registration, jamming susceptibility

INSTRUMENTATION:
UHF, SHF, EHF transmitters, receivers and antennas; modems, i/o transducers, test equipment, modulators, demodulators, various baseband equipment

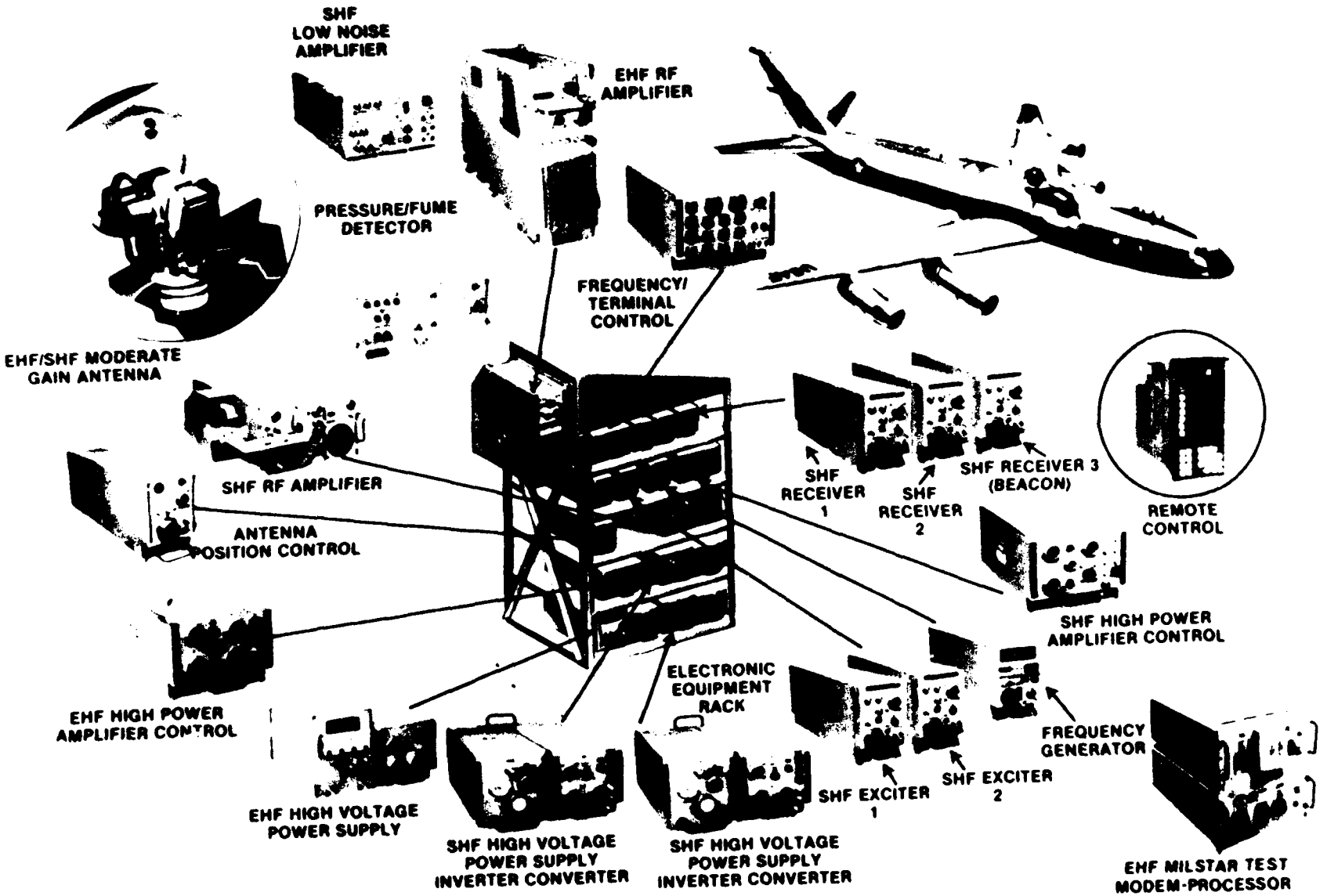
Inflated radome with ten foot diameter EHF antenna dish with two smaller antennas operable in SHF or EHF bands

Antenna pointing - Active track on downlink energy, computer aided passive pointing

AVAILABILITY:
Worldwide availability, available to U.S. government agencies, contractors

LOCATION:
BUILDING: 620 ROOM:

POINT OF CONTACT:
WRDC/AAAI
WPAFB, OH 45433-6543
(513) 255-2697
AV 785-2697



Satellite Communications Facility (SATCOM)

FACILITY TYPE:

Avionics Test

PURPOSE:

Test and evaluation of advanced avionics system configurations and subsystems, validation of contract research products in a systems context

FACILITY NAME:

Integrated Test Bed (ITB)

PRIMARY CAPABILITIES:

Real time simulation of aircraft performing an operational mission allows evaluation of capabilities across entire spectrum of performance requirements

Provides a direct (non-extrapolated) view of real world problems and considerations

SPECIAL/UNIQUE CAPABILITIES:

Real time simulation of interface signals

Generalized Avionics and Simulation/Integration System (GENASIS)

INSTRUMENTATION:

Avionics flight processors with Operational Flight Programs and the avionics multiplex data bus

Models set includes aircraft, sensors, weapons and external environment modules, VAX11/785/non-real time development, 3-CPU Harris 800 comples/real-time

GENASIS modular cockpit with six-nine inch diagonal color displays coupled with F-15 type stick and throttle, moving map display, fiber optics communications

AVAILABILITY:

Primarily in-house research

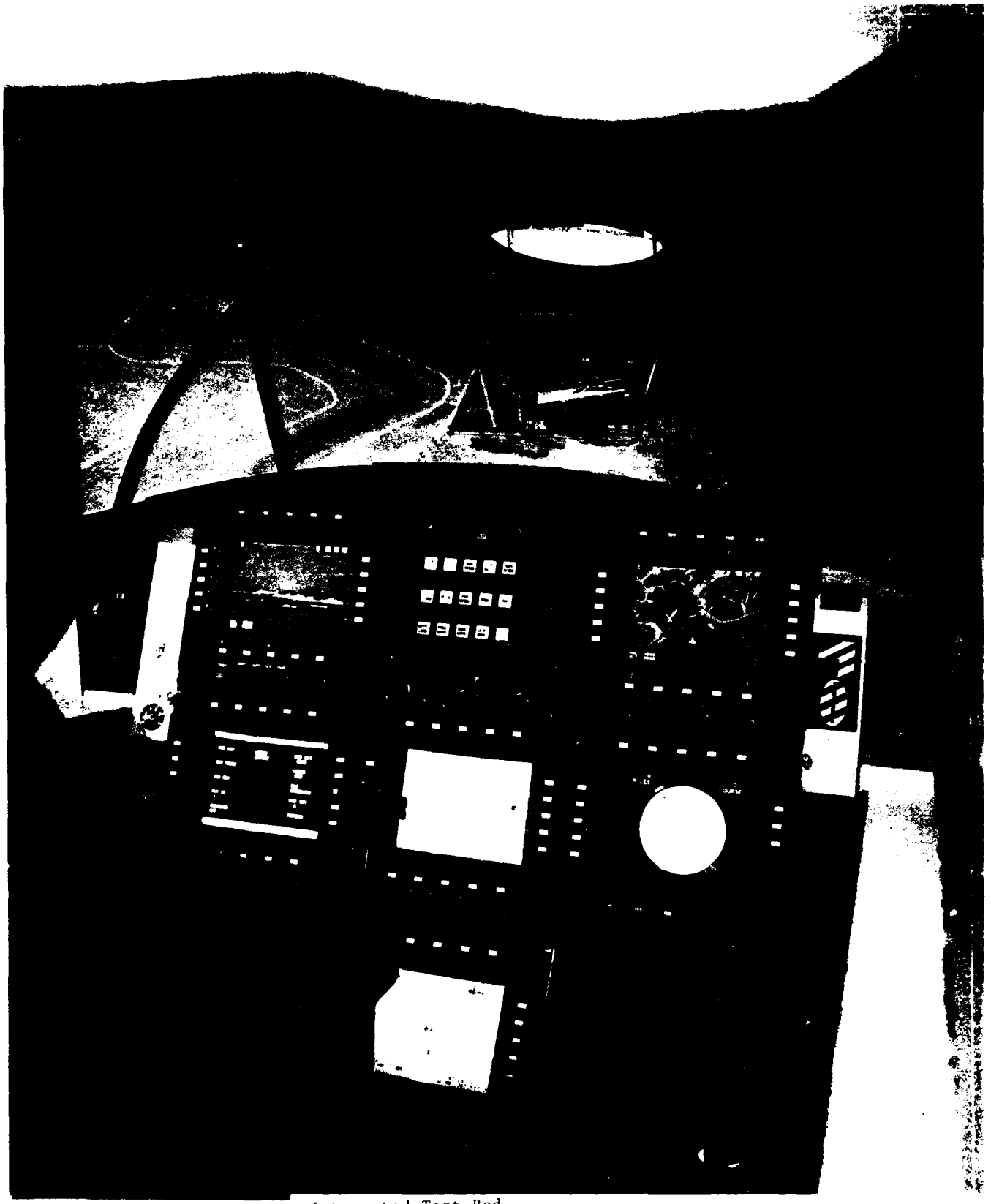
Limited use by Government contractors

LOCATION:

BUILDING: 620 ROOM:

POINT OF CONTACT:

WRDC/AAAS
WPAFB, OH 45433-6543
(513) 255-4827
AV 785-4827



Integrated Test Bed

FACILITY TYPE:

Signal/Data Processing

PURPOSE:

Development of crew station avionics, pilot aiding, signal and data processing, machine perception, and adaptive network research

FACILITY NAME:

Information Processing Laboratory

PRIMARY CAPABILITIES:

Research, development and evaluation of pilot aiding artificial intelligence and advanced computer architectures

SPECIAL/UNIQUE CAPABILITIES:

INSTRUMENTATION:

Three microvaxs, Vax 11/780 with attached AP-180V array processor, Symbolics LISP processor, IPS 8500 image processor, PDP 11/45 computer

Spectra-graphics work station

AVAILABILITY:

Primarily in-house research

LOCATION:

BUILDING: 620 ROOM:

POINT OF CONTACT:

WRDC/AAAT
WPAFB, OH 45433-6543
(513) 255-7652
AV 785-7652

Information Processing Laboratory

FACILITY TYPE:
Laboratory and Flight Instrumentation

PURPOSE:
Provide instrumentation/data collection for lab sensor/system evaluations; specialized flight instrumentation to define aircraft & sensor environment

FACILITY NAME:
Instrumentation Laboratory

PRIMARY CAPABILITIES:
Instrumentation and measurement capability covers parameters of pressure, vacuum, thermal, dynamics, acoustics, optics, and recording

Measures unique data related to sensor, aircraft and environme nt operation and conditions

Supports all types of environmental tests including flight measurements to define flight environments and complete sensor/system flight demo and eval tests

SPECIAL/UNIQUE CAPABILITIES:
Fabrication of special test and measurement instrumentation to support unique laboratory evaluations

Airborne flight packages to collect required data to establish sensor/system performance

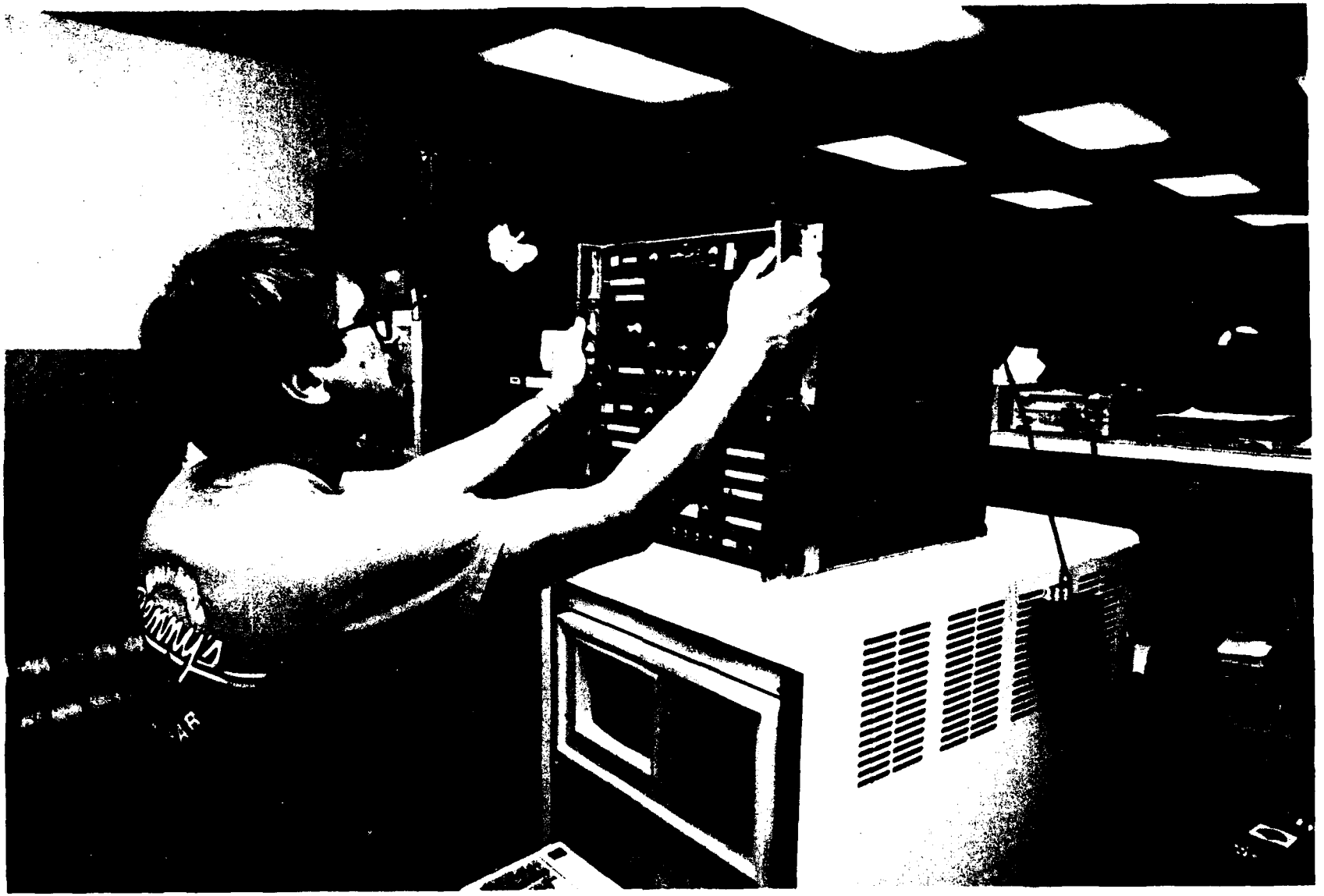
Standard and miniaturized instrumentation available; test teams and equipment deployable for total data reduction between flights

INSTRUMENTATION:
Complete instrumentation capability to support diverse laboratory analysis and evaluations, and simultaneous flight measurement programs

AVAILABILITY:
Reimbursement organization; maintains "Quick Reaction Capability"

LOCATION:
BUILDING: 23 ROOM:

POINT OF CONTACT:
WRDC/AARF
WPAFB, OH 45433-6543
(513) 255-5406
AV 785-5406



Instrumentation Laboratory

FACILITY TYPE:
Vibration

PURPOSE:
Analyze and solve difficult mechanical dynamics problems

FACILITY NAME:
Modal Analysis System

PRIMARY CAPABILITIES:
Determine resonant frequencies, mode shapes and damping values experimentally on mechanical structures

Evaluate effects that changes in damping stiffness and/or mass will have on a structure

SPECIAL/UNIQUE CAPABILITIES:
Multiple input, burst random excitation technique

Multiple degree of freedom analysis

INSTRUMENTATION:
16 channel GENRAD 2515 analyzer with SRDC MODAL PLUS software

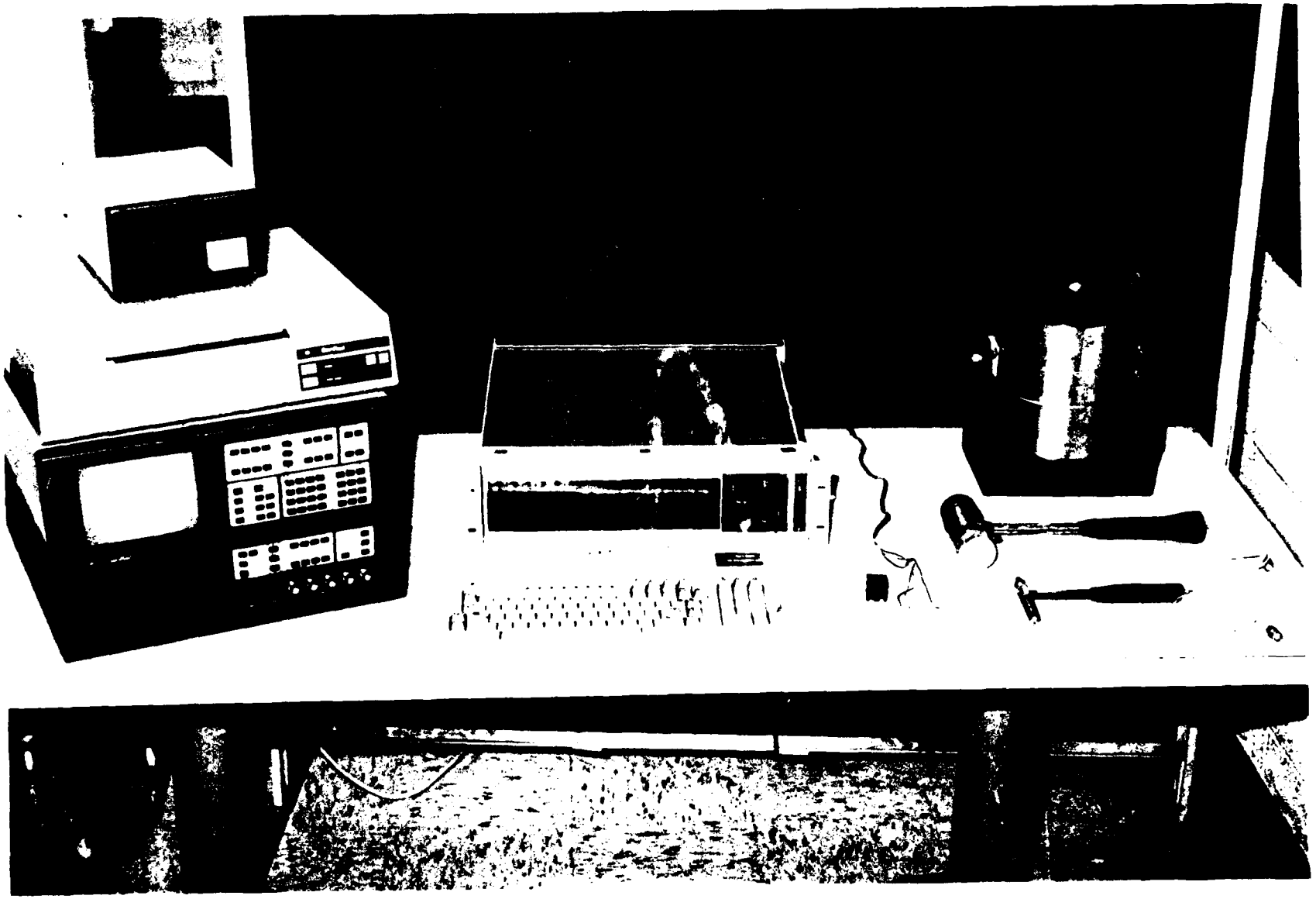
3 VTS 701bf vibrations shakers, PCB force transducers, accelerometers and signal conditioning units

Excitation equipment including equipment to do impact hammer and burst random excitation techniques

AVAILABILITY:
Primarily in-house

LOCATION:
BUILDING: 23 ROOM:

POINT OF CONTACT:
WRDC/AARF
WPAFB, OH 45433-6543
(513) 255-5263
AV 785-5263



Modal Analysis System

FACILITY TYPE:
Image evaluation and analysis

PURPOSE:
Analyze sensor system performance in use with automatic target acquisition technologies; Measure and evaluate output and correlate with acquisition conditions

FACILITY NAME:
Sensor Quality Analysis Laboratories (SEQAL I and II)

PRIMARY CAPABILITIES:
Quantitative analysis of sensed data using automatic data processing equipment and software programs and algorithms

Qualitative analysis of sensed data using trained image analysts and softcopy image processing equipment and displays

Analyze sensor systems performance using computer modeling and simulations and/or analysts' assessment of data quality and characteristics

SPECIAL/UNIQUE CAPABILITIES:
Ability to analyze and process all levels of classified data and sensors to include special access and compartmented systems

INSTRUMENTATION:
11/750and 785 VAX computers, image digitizers (EIKONIX 785), image processors (DEANZA IP8500), high bit rate recorder (AMPEX 3000), workstations (SUN 3), PC's

AVAILABILITY:
Available to all government agencies

A reimbursement facility

LOCATION:
BUILDING: 23 ROOM:

POINT OF CONTACT:
WRDC/AARF
WPAFB, OH 45433-6543
(513) 255-6329
AV 785-6329

SEQAL I and II

FACILITY TYPE:
Physical sensor/system flight simulation

PURPOSE:
Evaluate the design integrity and performance of R&D and operational avionics, and sensor/systems under simulated flight conditions

FACILITY NAME:
Sensor/System Dynamic Analyzer (DA)

PRIMARY CAPABILITIES:
Can handle sensors, equipment or aircraft sections up to 6ft D, 10ft L up to 3000 lbs; modifications to accommodate sensors 20ft L with 3ft Davailable

Can subject test items to conditions of temperature, altitude, 3-D vibration, roll, pitch and yaw, and angular rates and air flow

Both internal and external environments are simulated; Complete instrumentation is utilized to record input environmental conditions and output results/effects

Sensor/system design changes can be incorporated/analyzed under any combination of flight environments

SPECIAL/UNIQUE CAPABILITIES:
Simultaneous controlled visual, EO, and IR target environments during simulation

Simulated ground motion of target under variable controlled target conditions

Provides two vertical and one forward looking sensor specific type 24 inch diameter windows in DA test space shell

INSTRUMENTATION:
Computer Controlled Operational and Data Collection

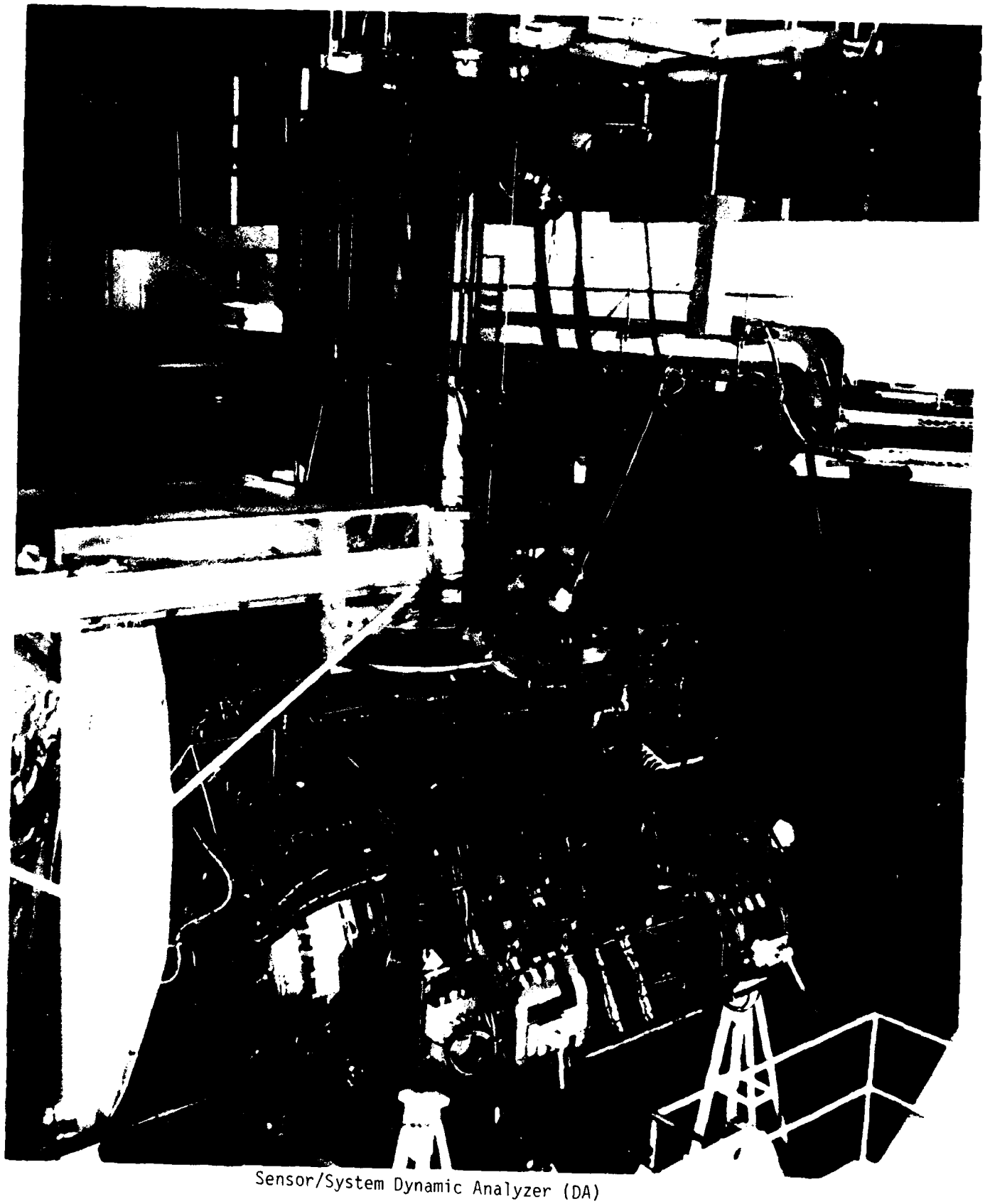
Complete instrumentation to support all test programs

AVAILABILITY:
A reimbursement facility

Primarily in-house, available to U.S Gov't agencies

LOCATION:
BUILDING: 23 ROOM:

POINT OF CONTACT:
WRDC/AARF
WPAFB, OH 45433-6543
(513) 255-5406
AV 785-5406



Sensor/System Dynamic Analyzer (DA)

FACILITY TYPE:
Electro-optical (EO) Sensors

PURPOSE:
Simulate air-to-ground environment for evaluation of EO targeting and navigation sensors

FACILITY NAME:
EO Sensors Modeling System

PRIMARY CAPABILITIES:
Develop/validate sensor performance models

Test passives countermeasure effectiveness

Evaluate operational and developmental EO sensor technology

SPECIAL/UNIQUE CAPABILITIES:
300 ft sensor platform

Optical link to EO sensor evaluation lab for real-time sensor analysis

Trebein Reservation containing visual and infrared targets

INSTRUMENTATION:
Fixed and portable meteorological stations

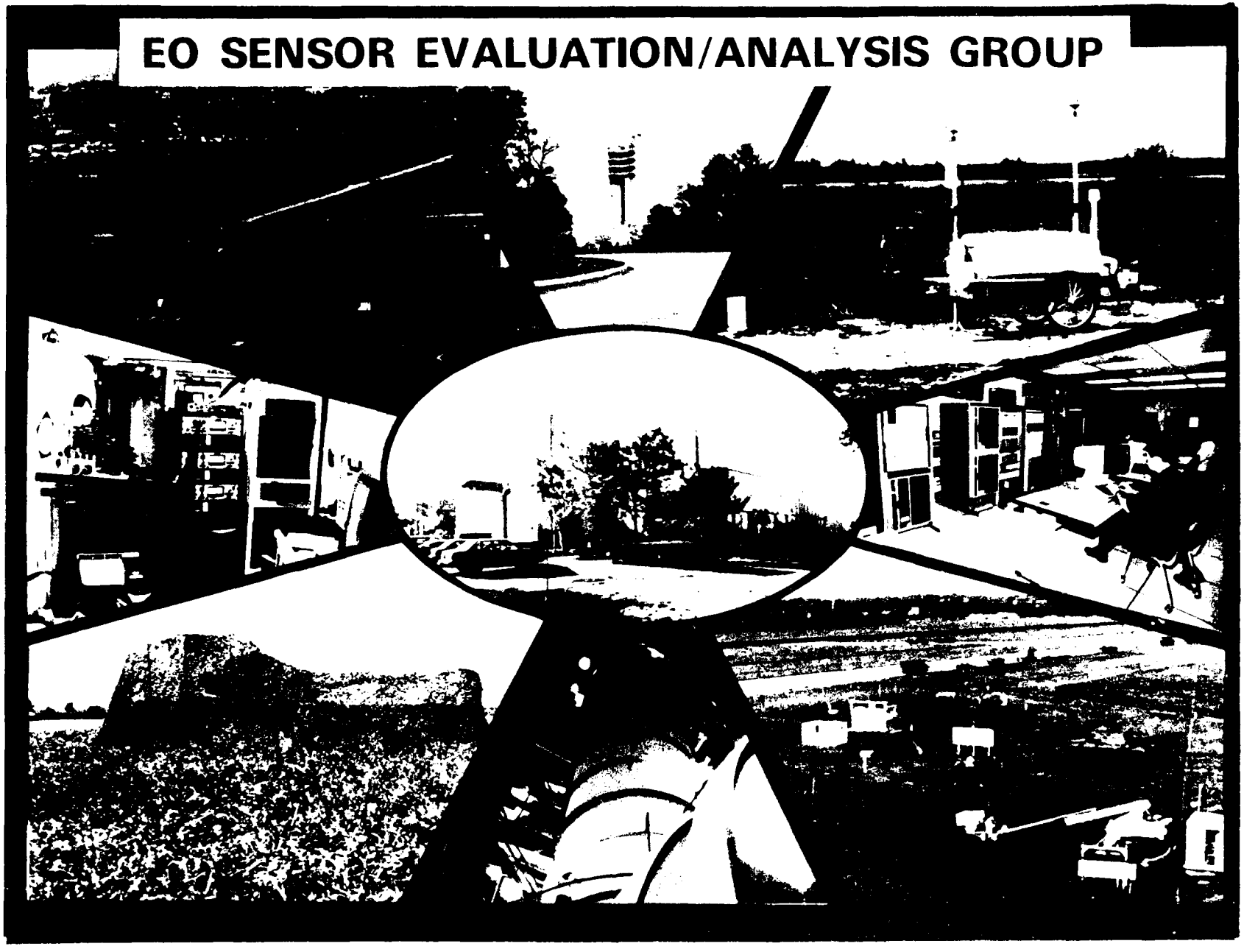
Fixed and portable EO signature (radiometric) measurement system

Fixed system and portable atmospheric transmission measurement systems

AVAILABILITY:
Available to U.S. Government agencies

LOCATION:
BUILDING: 620 ROOM:

POINT OF CONTACT:
WRDC/AARI
WPAFB, OH 45433-6543
(513) 255-9609
AV 785-9609


EO SENSOR EVALUATION/ANALYSIS GROUP

FACILITY TYPE:
Electro-Optical Sensors

PURPOSE:
Test and evaluate target acquisition and identification infrared electro-optical sensor systems

FACILITY NAME:
IR Laboratory

PRIMARY CAPABILITIES:
Provide data for system-to-system comparisons, input to models, development feedback, calibrations, technique development, and acceptance testing

SPECIAL/UNIQUE CAPABILITIES:
Receive (in Bldg 620) real time or recorded video signals from sensors undergoing field evaluations

Analyze flight test data

INSTRUMENTATION:
Infrared collimator/targets/sources

Image processing system

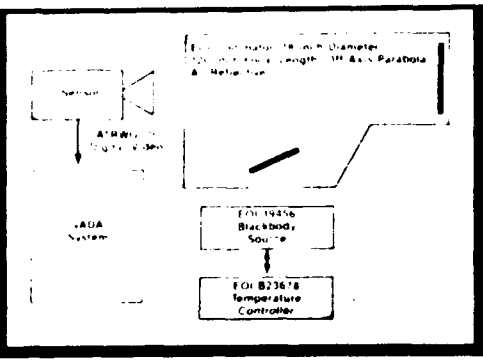
AVAILABILITY:
Available to US government agencies

LOCATION:
BUILDING: 622 ROOM: 127

POINT OF CONTACT:
WRDC/AARI
WPAFB, OH 45433-6543
(513) 255-9615
AV 785-9615

INFRARED SENSOR CHARACTERIZATION

LABORATORY SET-UP



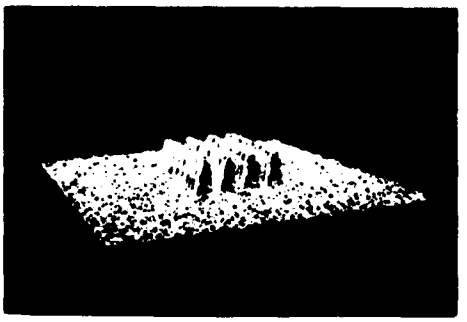
LABORATORY FACILITY

SENSOR TESTS

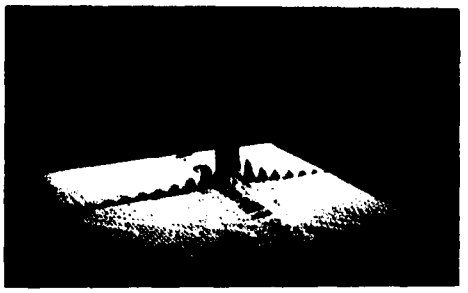
- Signal and Noise
  - Delta Signal, Signal-to-Noise, NEDT, Gain
- Modulation Transfer Function (MTF)
  - *One and Two Dimensional*
  - Square Wave Response
- Uniformity
  - Standard deviation, noise power spectrum, hist
- Minimum Resolvable Temperature
  - *Observer and Computerized*
- Distortion
- Time Base Error (Jitter)
- Blooming
- Dead or Improperly Sequenced Scan Lines
- Spectral Response

FOUR BAR TEST PATTERN

FOUR BAR INTENSITY PLOT



FOUR BAR FOURIER TRANSFORM



FACILITY TYPE:

Laser radar systems

PURPOSE:

Research, test and develop laser radar systems and system integration of novel component devices

FACILITY NAME:

Laser Radar Research Lab (LADAR)

PRIMARY CAPABILITIES:

Development of new system integration technologies of laser radar systems

Can perform heterodyne detection and fiber optic mixing

SPECIAL/UNIQUE CAPABILITIES:

Uses non-mechanical beam agility device

Combines beam agility devices in the receiver portion of the laser radar system

INSTRUMENTATION:

Solid state 1.06um Nd:YAg laser, consto-optic modulator, InGaAs detector, Faraday isolator, fiber couplers, digital oscilloscope

Two beam agility devices using liquid crystal phased-array technology

One beam agility device using phase grating concept using acousto-optic deflector modules

AVAILABILITY:

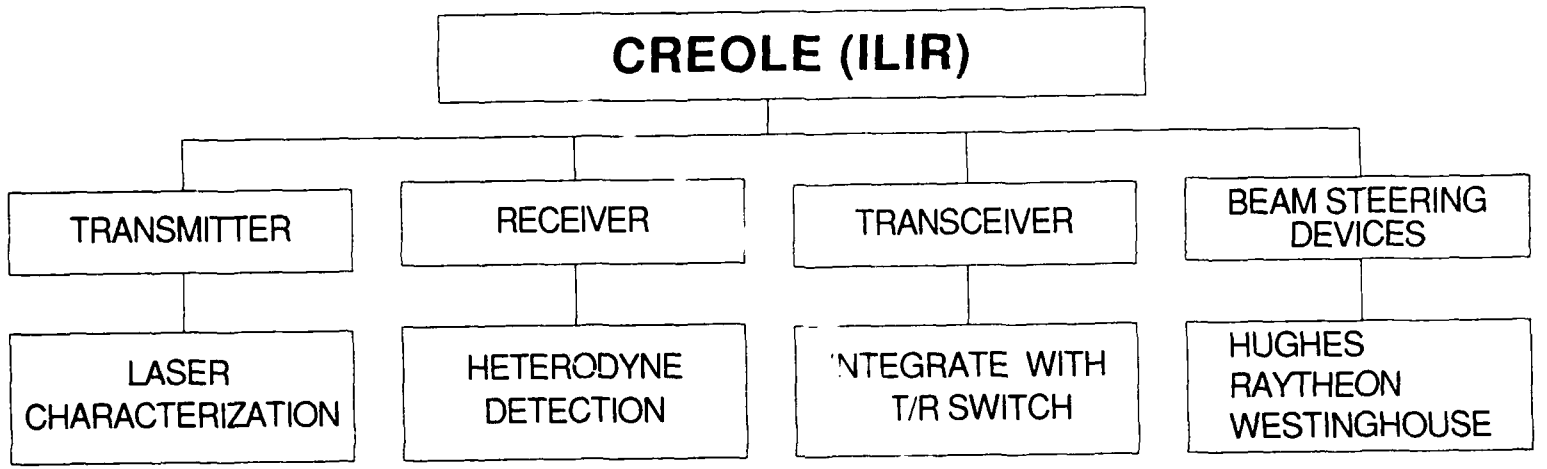
Available to U.S. government agencies, contractors and industry for DOD projects

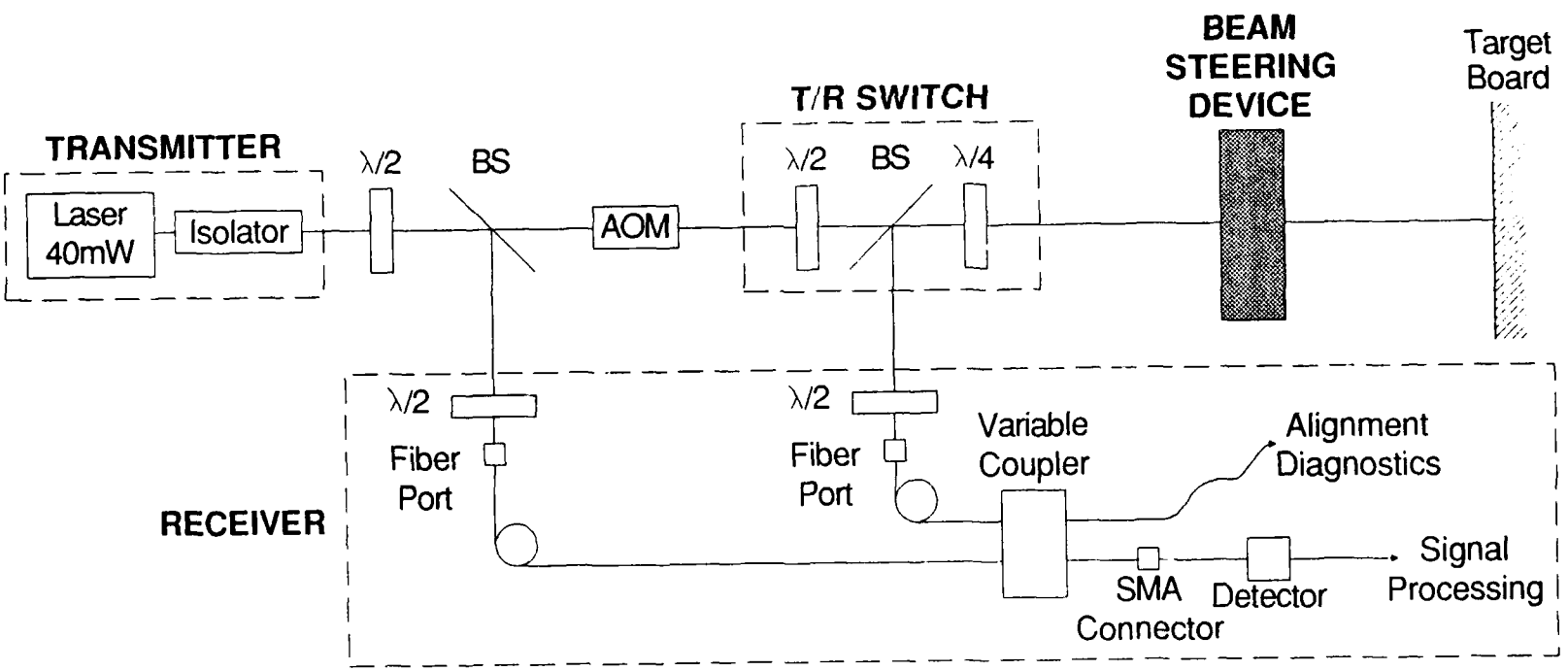
LOCATION:

BUILDING: 622 ROOM: 111

POINT OF CONTACT:

WRDC/AARI
WPAFB, OH 45433-6543
(513) 255-9615
AV 785-9615





Laser Radar Research Lab (LADAR)

FACILITY TYPE:

Electro-optical systems

PURPOSE:

Research, test, and analysis of electro-optical systems under simulated environmental conditions

FACILITY NAME:

Optical Radar Test Facility

PRIMARY CAPABILITIES:

Can measure far-field patterns of large antenna systems under controlled temperature and pressure conditions

Can conduct research investigations on large diameter optics and optical systems

SPECIAL/UNIQUE CAPABILITIES:

Test optical antennas up to 2.4 meters in diameter

Simulate altitudes up to 270,000 feet

INSTRUMENTATION:

Seismometers; 32-channel data logger, 8-channel digital chart recorder, PC based computer system

100 inch collimator in a vacuum chamber

Primary mirror with focal length of 600 inches, alternate focal lengths of 1200 or 2000 inches

AVAILABILITY:

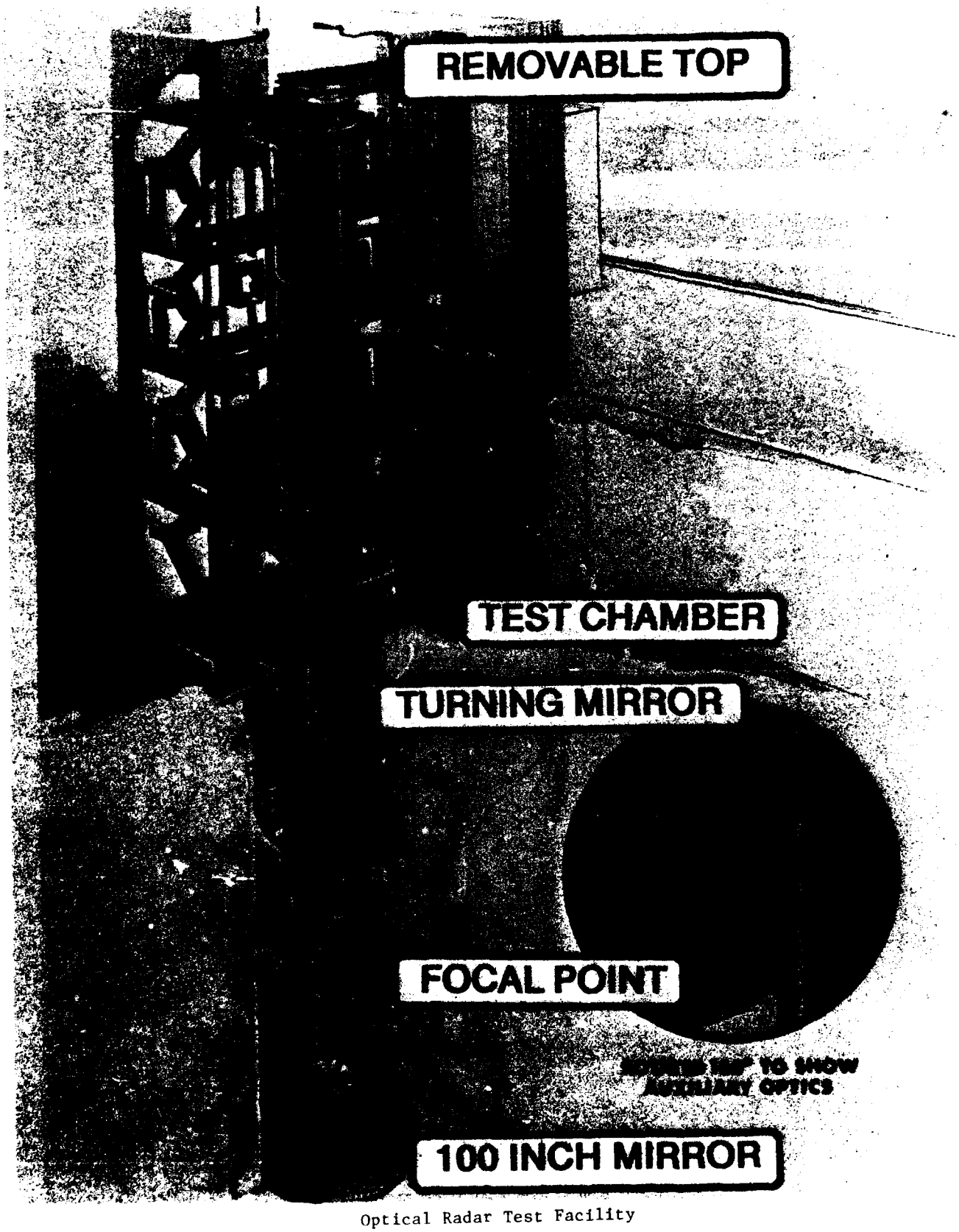
Available to U.S. government agencies, contractors and industry for DOD projects

LOCATION:

BUILDING: 622 ROOM: 128

POINT OF CONTACT:

WRDC/AARI
WPAFB, OH 45433-6543
(513) 255-9615
AV 785-9615



Optical Radar Test Facility

FACILITY TYPE:
Radar analysis and signal processing

PURPOSE:
Provide a state of the art modeling, analysis, simulation and signal processing environment for conducting air-to-air and air-to-ground radar system studies

FACILITY NAME:
Radar Analysis and Signal Processing Laboratory (RASPL)

PRIMARY CAPABILITIES:
Determine tradeoffs for optimum airborne system performance in an electronically hostile environment

True non-real-time simulation and analysis utilizing radar systems and radar sub-systems models and threat models

SPECIAL/UNIQUE CAPABILITIES:
Tempest approved facility for up to Secret level simulation, analysis and data processing

Pulse-by-pulse air-to-air and air-to-ground radar system models

INSTRUMENTATION:
VAX 11/750 and 785 computers, workstations (VAXstation 3), DEA NZA IP8500 image processors

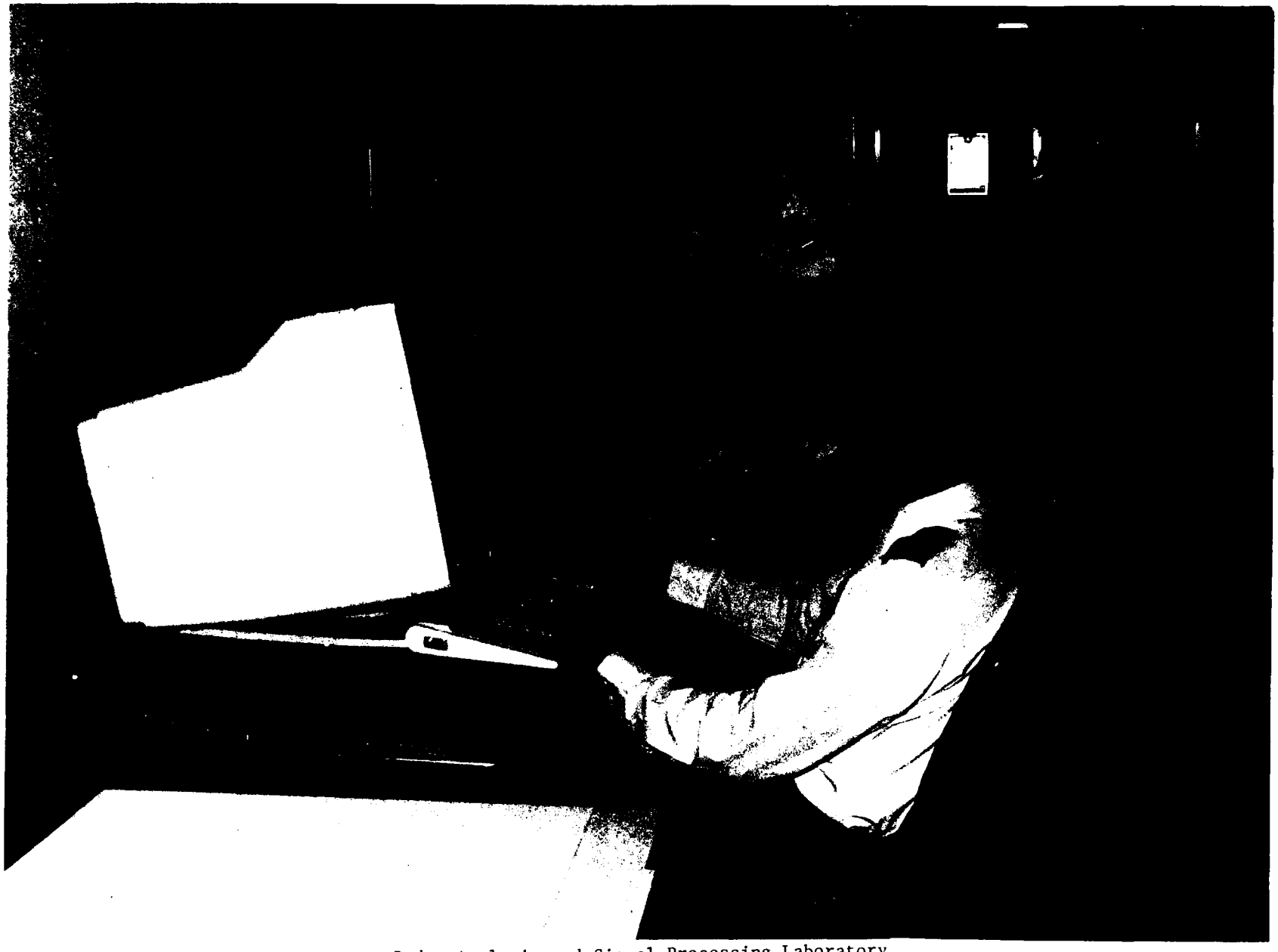
TU-77 and TU-78 digital tape recorders, remote graphics terminals and PC's

AVAILABILITY:
Primarily in-house research

Limited to some US government agencies

LOCATION:
BUILDING: 22 ROOM: H104

POINT OF CONTACT:
WRDC/AARM
WPAFB, OH 45433-6543
(513) 255-3655
AV 785-3655



Radar Analysis and Signal Processing Laboratory

FACILITY TYPE:
Fire control simulation

PURPOSE:
Process engineering analysis of fire control system performance, develop fire control algorithms, determine sensor performance requirements

FACILITY NAME:
Fire Control Simulation Facility (FICSIM)

PRIMARY CAPABILITIES:
Analysis of fire control system performance in air-to-air arena(AASPEM), air-to-ground arena (MACE and MULTACK), and space-to-space (SDISEM) arena

Detailed modeling of radar sensors with AIRADE program, electro-optic sensors in the EOSIM model

Data reduction using PV~Wave or Dataplot programs

Subroutine packs: Numerical Algorithm Group (NAG), Precision Visuals Inc. (PVI) graphics, and Basic Astrodynamics (BASTRO) subroutines

SPECIAL/UNIQUE CAPABILITIES:
Have both classified and unclassified fire control simulation processing capability

INSTRUMENTATION:
Vax computers (11/780 and Microvax)

IRIS 3030 graphics work station and PC's

Software mentioned above

AVAILABILITY:
Available to U.S. government agencies

LOCATION:
BUILDING: 22 ROOM: H107

POINT OF CONTACT:
WRDC/AART
WPAFB, OH 45433-6543
(513) 255-3215
AV 785-3215

Fire Control Simulation Facility (FICSIM)

FACILITY TYPE:
EW environment simulation

PURPOSE:
Test and evaluate radar homing, warning and electronic intelligence receivers

FACILITY NAME:
Dynamic/Combat Electromagnetic Environment Simulator (DEES/CEESIM)

PRIMARY CAPABILITIES:
Simulate both ground and airborne emitters as seen by a moving penetrator in a realistically dense operating environment

Simultaneously simulate all of the antenna outputs of a typical RWR Array

Used in conjunction with colocated IDAL and EDE to test integrated closed loop, receiver jammer suites in high density environments

SPECIAL/UNIQUE CAPABILITIES:
Interactive capability to "fly" through a threat environment

INSTRUMENTATION:
Manual instrumentation, ALR-46 RWR

Automated environment monitoring and data collection

AVAILABILITY:
Primarily in-house

Available to U.S. Government agencies, industry, government contractors

LOCATION:
BUILDING: 620 ROOM: S1C32

POINT OF CONTACT:
WRDC/AAWA
WPAFB, OH 45433-6543
(513) 255-4264
AV 785-4264

Dynamic/Combat Electromagnetic Environment Simulator (DEES/CEESIM)

FACILITY TYPE:
Generic closed loop threat simulator

PURPOSE:
Feasibility test and evaluation of developmental ECM techniques and concepts

FACILITY NAME:
Electronic Defense Evaluator (EDE)

PRIMARY CAPABILITIES:
Simulate tactical, many-on-one engagements between a generic, manned threat radar system (search, acquisition, or track) and penetrating ECM equipped aircraft

Operate on-line with IDAL and DEES/CEESIM to evaluate the responses of automatic ECM systems in high density environments

SPECIAL/UNIQUE CAPABILITIES:
Space-based clutter simulation is available to support satellite survivability testing, chirp radar simulation, and sidelobe blanking and/or cancellation

Phase meter doppler processor implementation

INSTRUMENTATION:
Mainframe computer provides real-time control of signal propagation path modulation factors

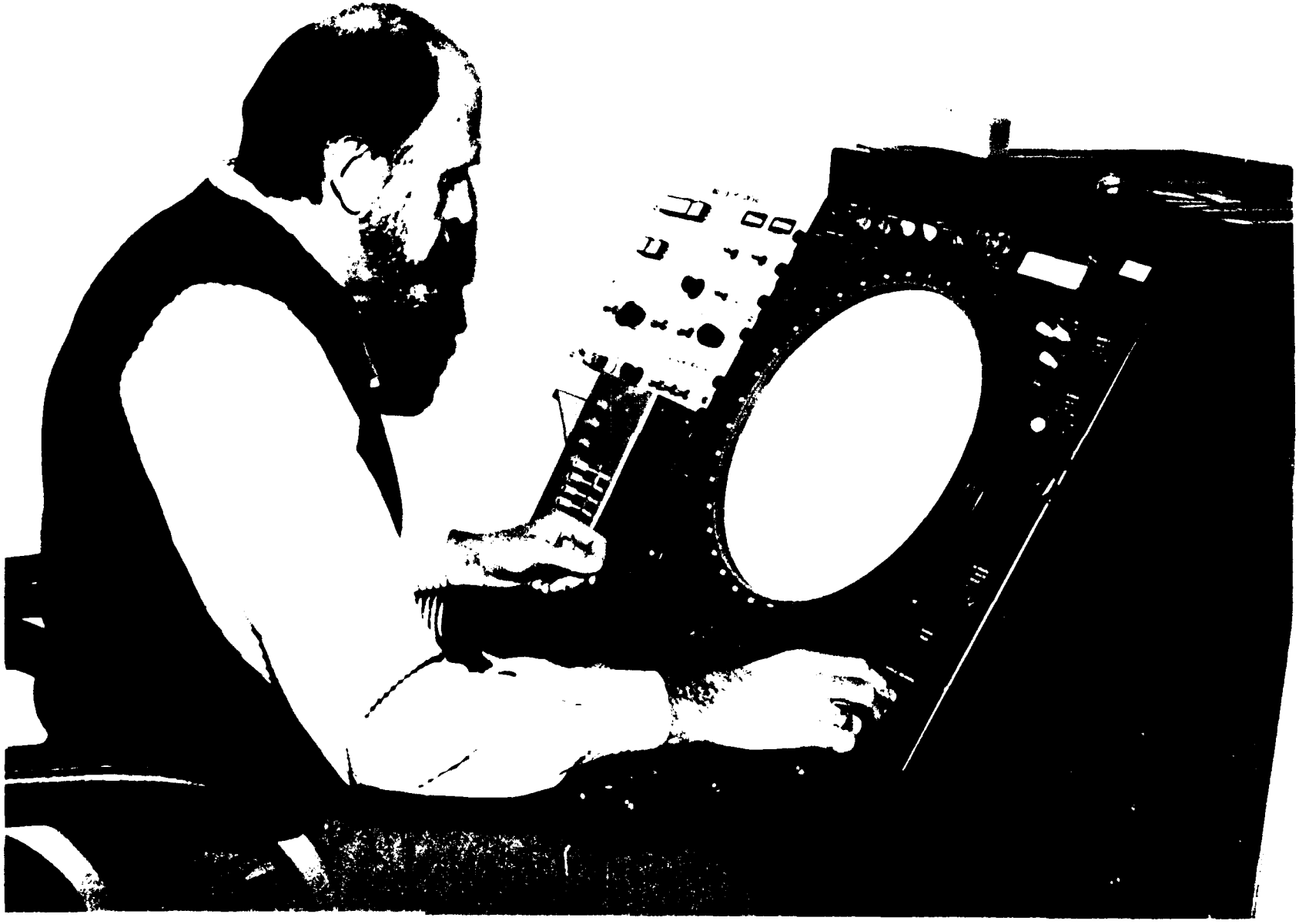
Also provides computation of performance factors as well as test data collection

AVAILABILITY:
Primarily in-house

Available to U.S. Government agencies, industry, and government contractors

LOCATION:
BUILDING: 620 ROOM: S1C32

POINT OF CONTACT:
WRDC/AAWA
WPAFB, OH 45433-6543
(513) 255-4264
AV 785-4264



FACILITY TYPE:

Hybrid/real-time digital simulation laboratory

PURPOSE:

To conduct integrated EW system/concept evaluation in support of Air Force Exploratory and Advanced Development programs

FACILITY NAME:

Integrated Defensive Avionics Laboratory (IDAL)

PRIMARY CAPABILITIES:

Real-time, interactive, multispectral EW simulation to drive hardware systems or digital emulations

SPECIAL/UNIQUE CAPABILITIES:

Real-time, interactive implementation of SUPPRESSOR command and control model, digital IR/EO scene generator, real-time digital RWR emulation

Interaction with DEES/CEESIM RF environment generators, interaction with Integrated Test Bed cockpit/avionics simulator

Interaction with Electronic Defense Evaluator threat radar simulator

INSTRUMENTATION:

VAX 11/750, Vaxstation 2, Vaxstation 3, Sun 4, CCC3240, CCC3260 MPS

AVAILABILITY:

Primarily in-house, available to U.S. Government agencies

Dedicated to Avionics Lab Exploratory and Advanced Development Programs

LOCATION:

BUILDING: 620 ROOM: S1C32

POINT OF CONTACT:

WRDC/AAWA
WPAFB, OH 45433-6543
(513) 255-4429
AV 785-4429

Integrated Defensive Avionics Laboratory (IDAL)

FACILITY TYPE:
Electronic combat simulation

PURPOSE:
Develop requirements for electronic combat equipment; evaluate electronic combat equipment

FACILITY NAME:
Electronic Combat Research Simulation Laboratory (ECSRL)

PRIMARY CAPABILITIES:
Three levels of digital simulation: one-on-one, one-on-many and campaign level (many-on-many)

SPECIAL/UNIQUE CAPABILITIES:
Classified TEMPEST facility

INSTRUMENTATION:
Electronic and data processing hardware

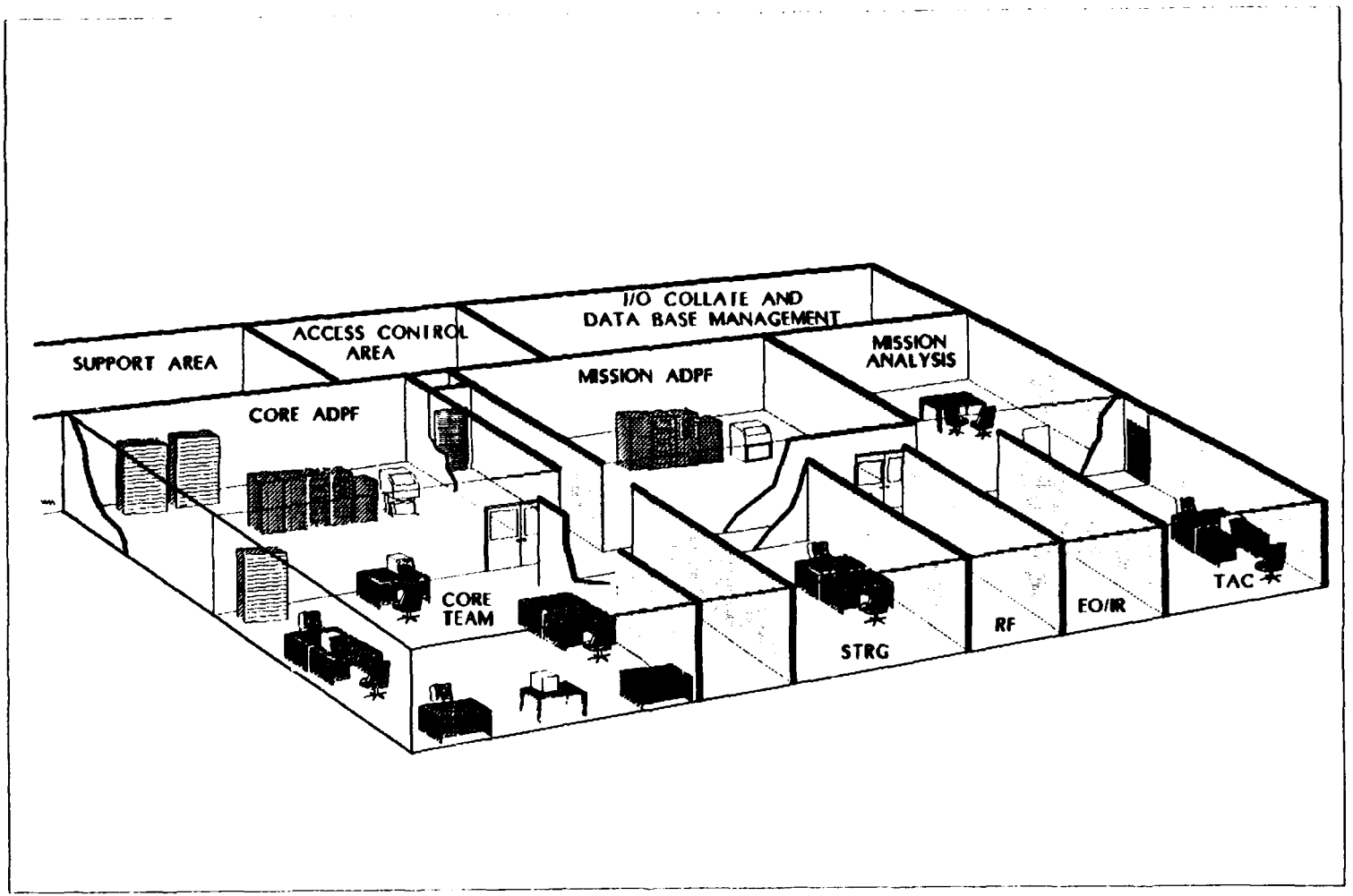
7500 square foot facility

AVAILABILITY:
Primarily in-house research; Limited use by Government contractors

Limited U.S. government agency use

LOCATION:
BUILDING: 620 ROOM: 1st FL

POINT OF CONTACT:
WRDC/AAWA
WPAFB, OH 45433-6533
(513) 255-4429
AV 785-4429



Electronic Combat Research Simulation Lab

FACILITY TYPE:
Exploitation

PURPOSE:
Radar evaluation of exploitation threat radar systems; conduct ECM evaluation against these threat radars

FACILITY NAME:
Hangar 4B Anechoic Chamber

PRIMARY CAPABILITIES:
Chamber can accommodate RF systems from 2 GHz to 20 GHz

Connected to a computer facility that simulates the outside EW environment, ground clutter, and geometry between the target and the aircraft

SPECIAL/UNIQUE CAPABILITIES:
Basic dimensions: 105 ft long by 50 ft wide by 35 ft high

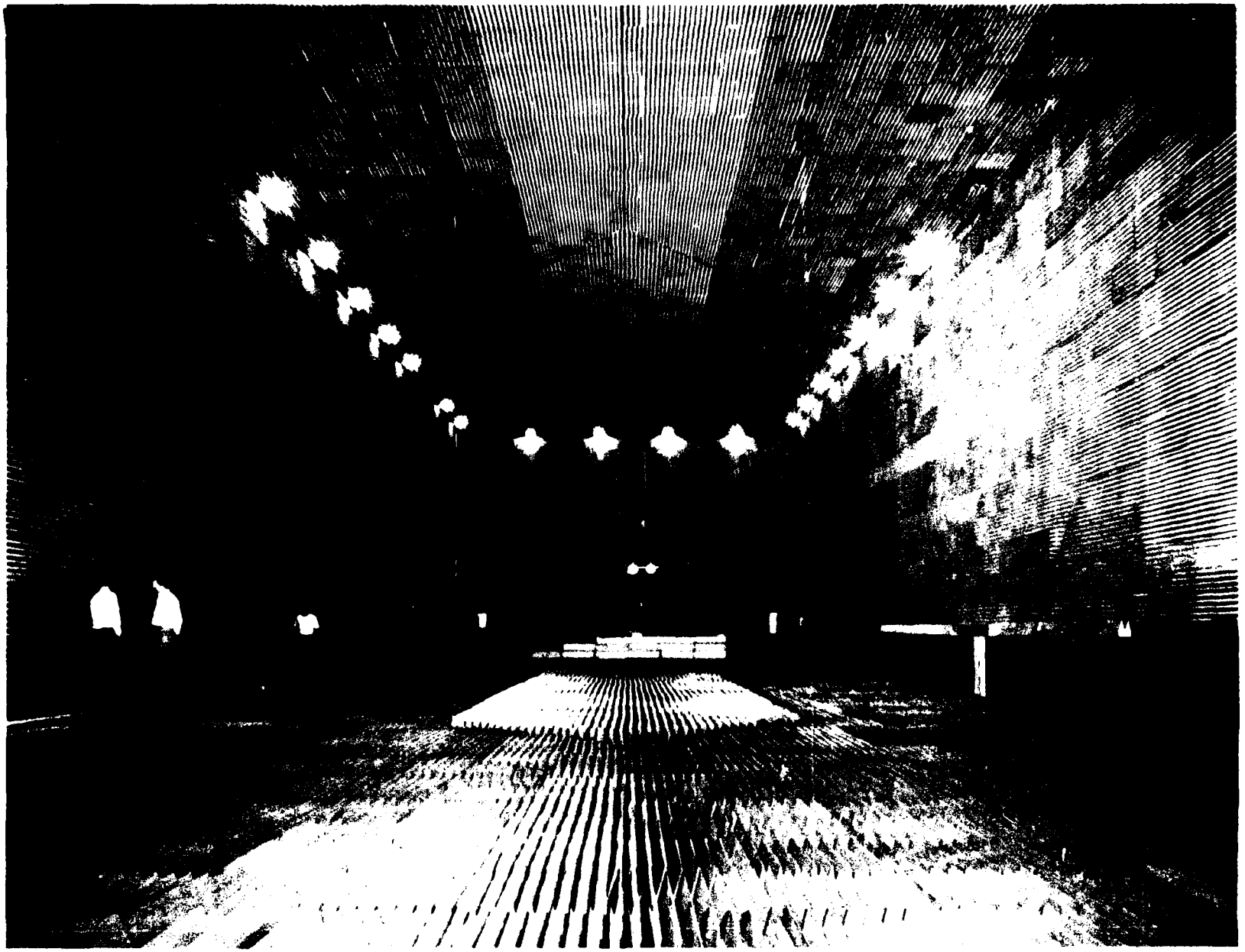
Chamber is connected to movable hangar door allowing insertion of tactical size USAF fighter aircraft

INSTRUMENTATION:
Equipment on hand can accommodate radar/ECM evaluations

AVAILABILITY:
Fully scheduled for next five to six years (1995-96)

LOCATION:
BUILDING: 4B ROOM:

POINT OF CONTACT:
WRDC/AAWP
WPAFB, OH 45433-6543
(513) 255-2471
AV 785-2471



Hanger 4B Anechoic Chamber

FACILITY TYPE:
E-O devices

PURPOSE:
Test and evaluate IR and laser warning receivers

FACILITY NAME:
Electro-Optical Receiver Laboratory

PRIMARY CAPABILITIES:
Calibrate, test, and evaluate infrared and laser sensors and warning receivers in Bands I, II, and III

SPECIAL/UNIQUE CAPABILITIES:
Classified facility with additional capabilities for foreign equipment exploitation

Capability for both laboratory and field testing

Field tests utilize outdoor WRDC turntable facility located on WPAFB, Area C, flight line for rotation of full scale aircraft

INSTRUMENTATION:
Large array of optical, electronic, and data processing hardware in a facility comprising greater than 5000 square feet

Equipment account exceeds a value of $2,000,000

AVAILABILITY:
Available on a case-by-case basis to support outside R&D

Utilized nearly full-time supporting in-house projects

LOCATION:
BUILDING: 4B ROOM:

POINT OF CONTACT:
WRDC/AAWP
WPAFB, OH 45433-6543
(513) 255-2471
AV 785-2471

Electro-Optical Receiver Laboratory

FACILITY TYPE:
Integrated Circuits

PURPOSE:
Identify unknown Integrated circuits (ICs)

FACILITY NAME:
Integrated Circuit Exploitation Facility

PRIMARY CAPABILITIES:
Identify undamaged unknown ICs and predict the identity of damaged ICs

SPECIAL/UNIQUE CAPABILITIES:
Classified facility with capability for foreign item exploitation

INSTRUMENTATION:
Jet etcher to non-destructively open ICs; temperature-humidity environmental chamber; an X-ray machine

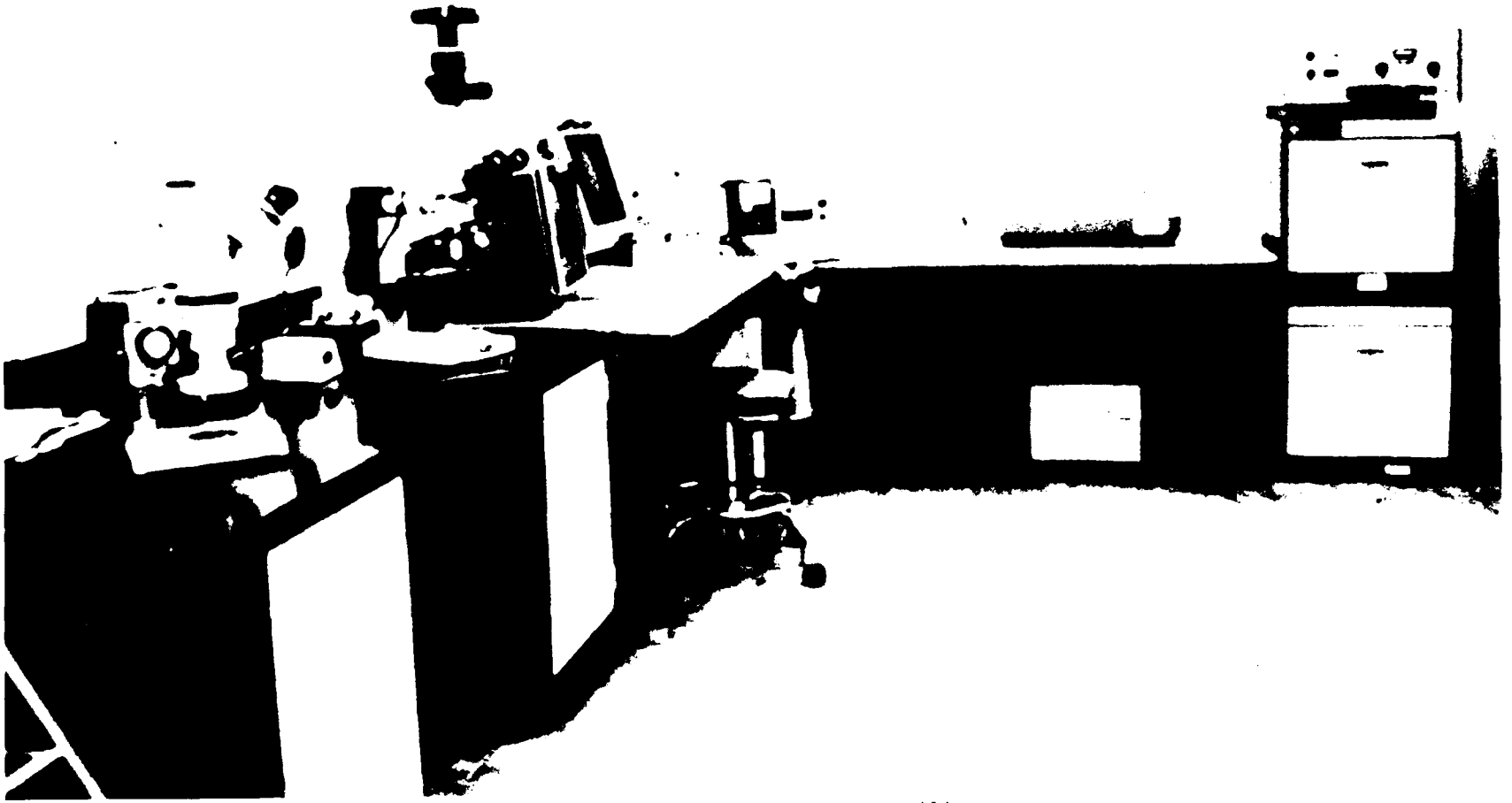
Optical microscopes; a scanning electron microscope; a computerized IC database

AVAILABILITY:
Case-by-case basis to support outside R&D (government agencies, contractors)

Utilized nearly full-time supporting in-house projects

LOCATION:
BUILDING: 4B ROOM:

POINT OF CONTACT:
WRDC/AAWP
WPAFB, OH 45433-6543
(513) 255-2471
AV 785-2471



Integrated Circuit Exploitation Facility

FACILITY TYPE:
Missile Simulator

PURPOSE:
Research and develop infrared countermeasures (IRCM) techniques

FACILITY NAME:
Dynamic Infrared Missile Evaluator (DIME)

PRIMARY CAPABILITIES:
Provides semiphysical simulation of the homing interception of a target by an IR guided missile

Hardware-in-the-loop infrared (heat seeking) missile simulation

SPECIAL/UNIQUE CAPABILITIES:
Use actual IR missile optics and guidance electronics along with computer simulated, aerodynamic characteristics and servo controlled IR sources

INSTRUMENTATION:
Operational IR missile guidance and control units

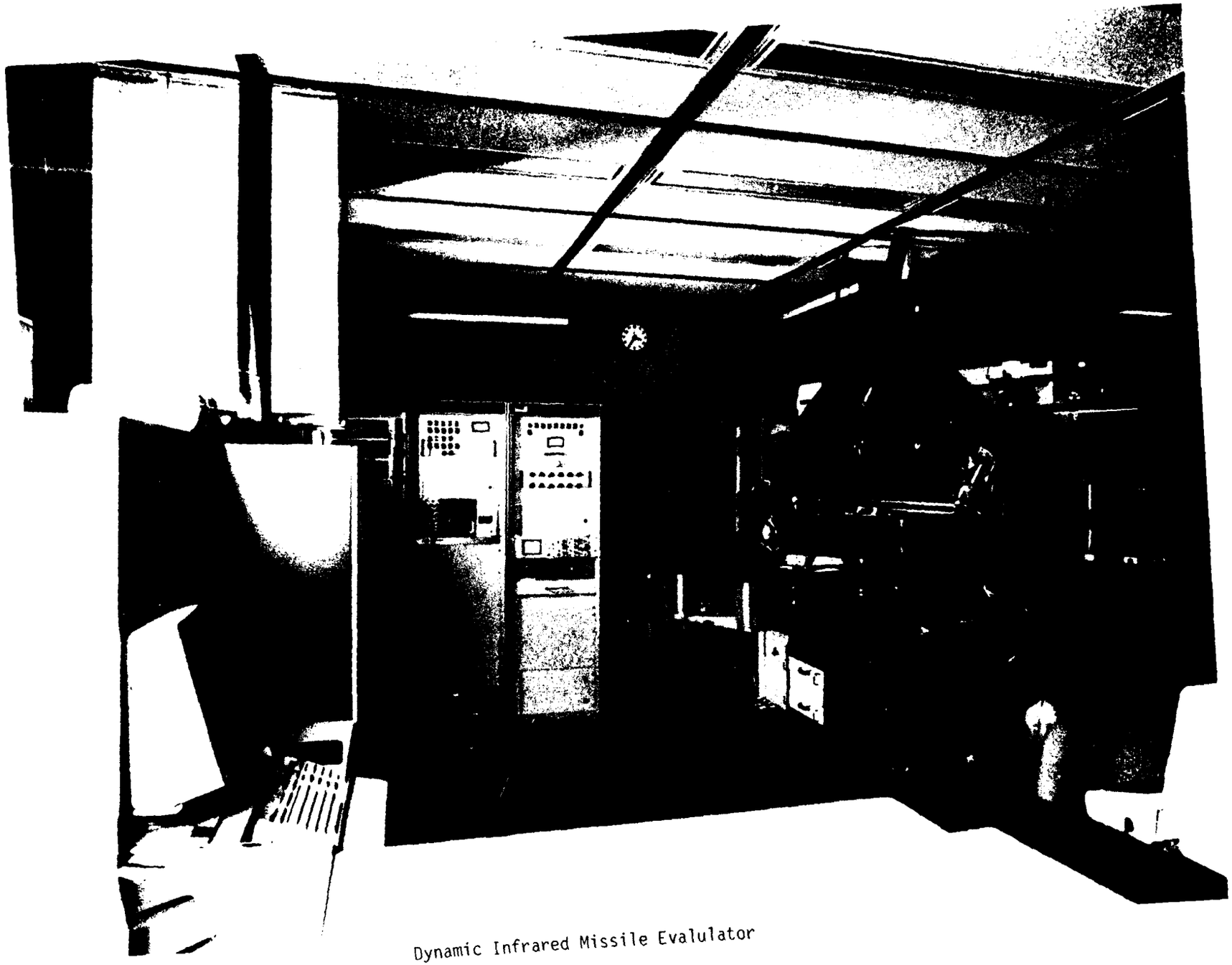
Digital aerodynamic computational capability

Servo-controlled IR sources/optics

AVAILABILITY:
Primarily in-house research

LOCATION:
BUILDING: 620 ROOM: C/A 33

POINT OF CONTACT:
WRDC/AAWW
WPAFB, OH 45433-6543
(513) 255-4174
AV 785-4174



Dynamic Infrared Missile Evalulator

FACILITY TYPE:
Electronic Warfare

PURPOSE:
Develop and evaluate RF electronic countermeasures techniques, devices, and systems

FACILITY NAME:
Electronic Warfare Anechoic Chamber (EWAC)

PRIMARY CAPABILITIES:
Radar direction finding system evaluation and optimization

Exploitation of foreign threat systems

Optimization of ECM antenna placement on aircraft and ECM pods

SPECIAL/UNIQUE CAPABILITIES:
Simultaneous operation of a threat radar and an ECM device in a free space environment

No interference to/from outside radars or detection by electronic intelligence (ELINT) systems

INSTRUMENTATION:
39'L x 26'W x 26'H shielded room completely lined with radio frequency (RF) energy absorbing material

AVAILABILITY:
Primarily in-house research

LOCATION:
BUILDING: 620 ROOM: S2R1

POINT OF CONTACT:
WRDC/AAWW
WPAFB, OH 45433-6543
(513) 255-6504
AV 785-6504

Electronic Warfare Anechoic Chamber (EWAC)

FACILITY TYPE:

Image Processing

PURPOSE:

Develop, optimize, and evaluate electro-optical camoflauge schemes for aircraft

FACILITY NAME:

Electro-Optical Signature Analysis System (EOSAS)

PRIMARY CAPABILITIES:

Interactive image processing system that allows aircraft signature reductions to be designed, modified, and evaluated by use of an image array processor

SPECIAL/UNIQUE CAPABILITIES:

Can manipulate imagery representing both the aircraft signature and camoflauge treatment of interest

Multi-spectral tool to be used for signature analysis into the year 2000 and beyond

Can be used to evaluate field test data

INSTRUMENTATION:

Image processing software

Probability of detection software

SPIRITS

AVAILABILITY:

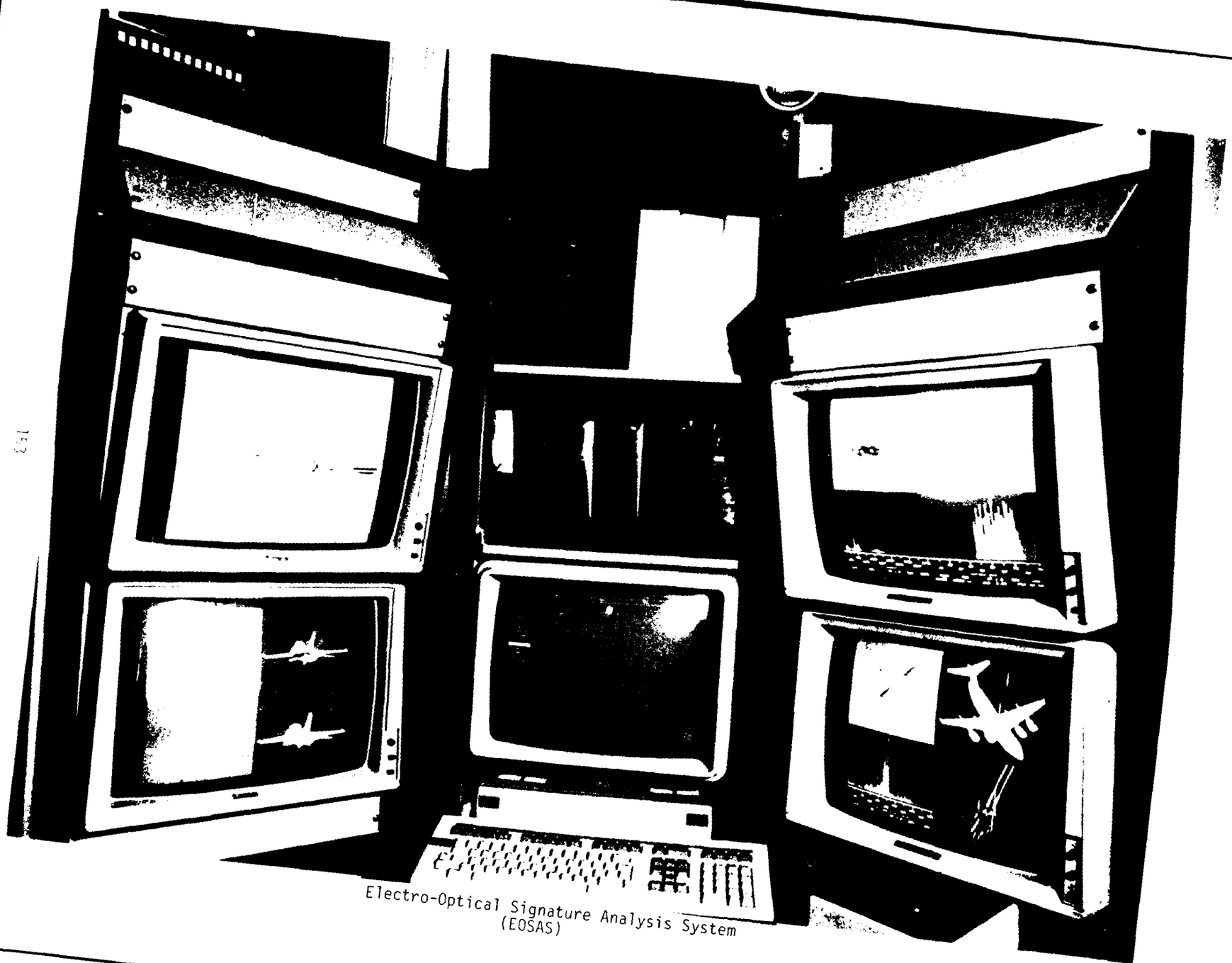
Primarily in-house research

LOCATION:

BUILDING: 620 ROOM: C/A33

POINT OF CONTACT:

WRDC/AAWW
WPAFB, OH 45433-6543
(513) 255-4174
AV 785-4174



Electro-Optical Signature Analysis System
(EOSAS)


MATERIALS LABORATORY

FACILITY TYPE:
Advanced Composite Materials

PURPOSE:
Conduct mechanical property tests on advanced composite materials

FACILITY NAME:
Mechanics of Composites Test Laboratory

PRIMARY CAPABILITIES:
Static and dynamic testing of composite material, coupons

Environmental testing of coupons (temperature, moisture)

Generation of strength, and modulus data

SPECIAL/UNIQUE CAPABILITIES:
600 degF elevated temperature

-100 degF low temperature chamber

Combined tension-torsion testing; load or displacement controlled testing

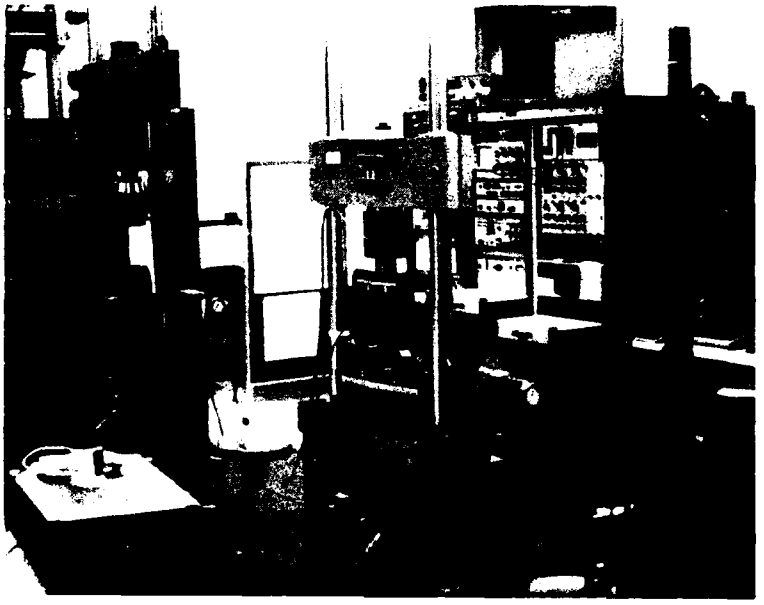
INSTRUMENTATION:
Foil type strain gauges; extensometers

Thermocouples; acoustic emission

AVAILABILITY:
Primarily in-house research

LOCATION:
BUILDING: 654 ROOM: 234

POINT OF CONTACT:
WRDC/MLBM
WPAFB, OH 45433-6533
(513) 255-7131
AV 785-7131



Mechanics of Composites Test Lab

FACILITY TYPE:
Epitaxial Film Growth

PURPOSE:
Research epitaxial film growth

FACILITY NAME:
Molecular Beam Epitaxy and Surface Analysis Instrument

PRIMARY CAPABILITIES:
Epitaxial film growth of III-V semiconductor materials

Surface analytic instrumentation

SPECIAL/UNIQUE CAPABILITIES:
In-site film growth and surface analysis capability

Fully computer controlled

INSTRUMENTATION:
Eight Knudsen cells

Scanning auger microscope

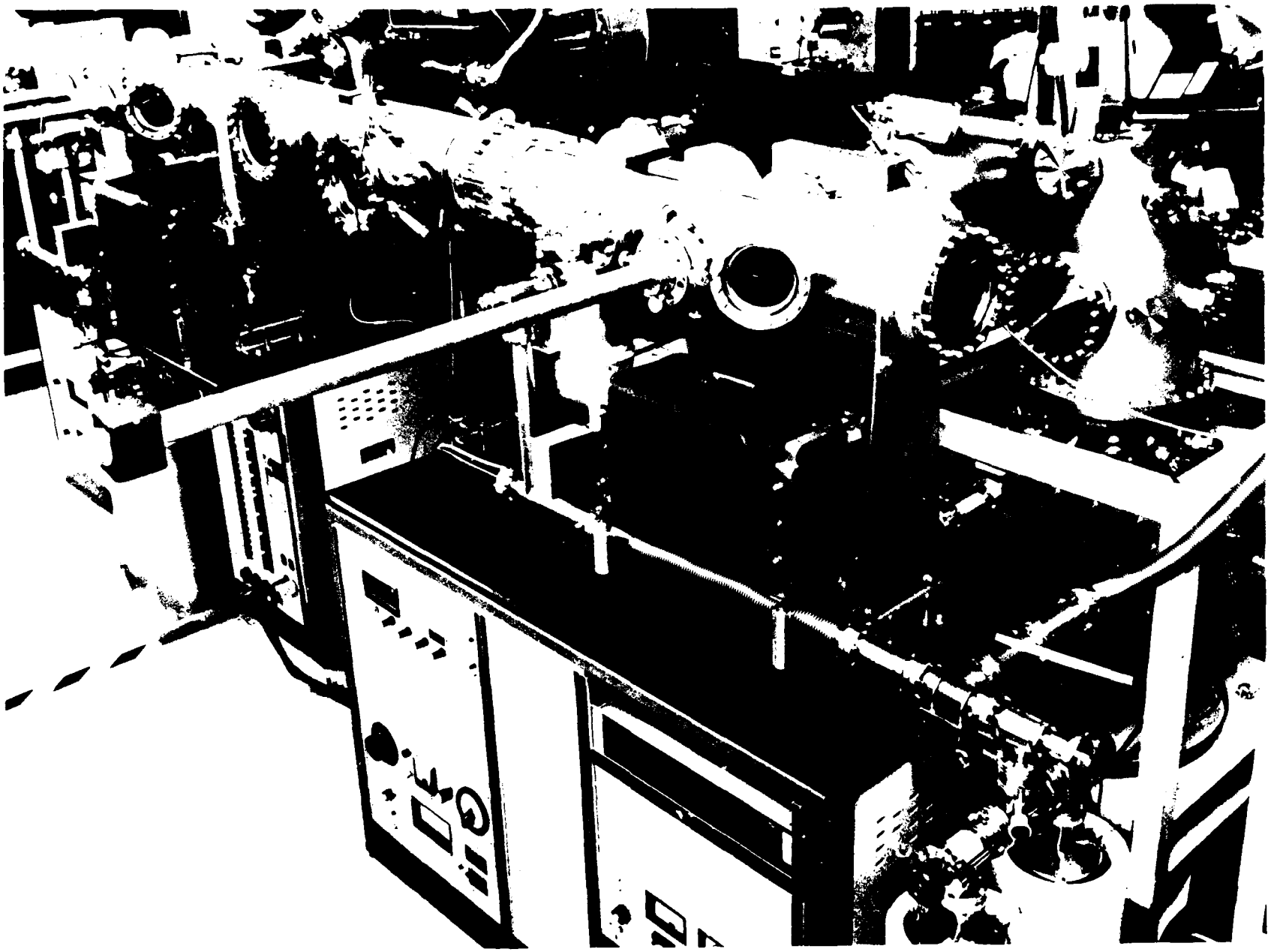
X-ray photoexcitation spectroscopy; ion scattering spectrometry

AVAILABILITY:
Primarily in-house research

Limited U.S. Government agency use

LOCATION:
BUILDING: 652 ROOM: 136

POINT OF CONTACT:
WRDC/MLBM
WPAFB, OH 45433-6533
(513) 255-5892
AV 785-5892



Molecular Beam Epitaxy and Surface Analysis Instrument

FACILITY TYPE:
Elastomer Characterization

PURPOSE:
Formulate and evaluate elastomeric materials (seals and sealants) for Air Force applications

FACILITY NAME:
Elastomers Facility

PRIMARY CAPABILITIES:
Elastomer compounding in various sizes (micro, 3x5, 8x12, 8x15 rubber mills)

Elastomer curing and post curing (two 50 ton and one 10 ton presses; four ovens with 600 degF capability)

Fluid aging of elastomers (low temperature and explosion proof ovens)

Dynamic testing of O-ring and special design seals (8000 psi, 350 degF capability)

SPECIAL/UNIQUE CAPABILITIES:
Only facility currently capable of testing candidate seals for chlorotrifluoroethylene hydraulic fluid at 350 degF

Measurement of drag force and correlation with seal designs

Wide frequency range of dynamic seal testing (20 Hz to .01 Hz; .01 to 2.50 inch stroke; both rod and piston seal test cells available

INSTRUMENTATION:
Instron Model 1102 and 4201, 1100 and 5000 lb Tensile Testers, computer automated

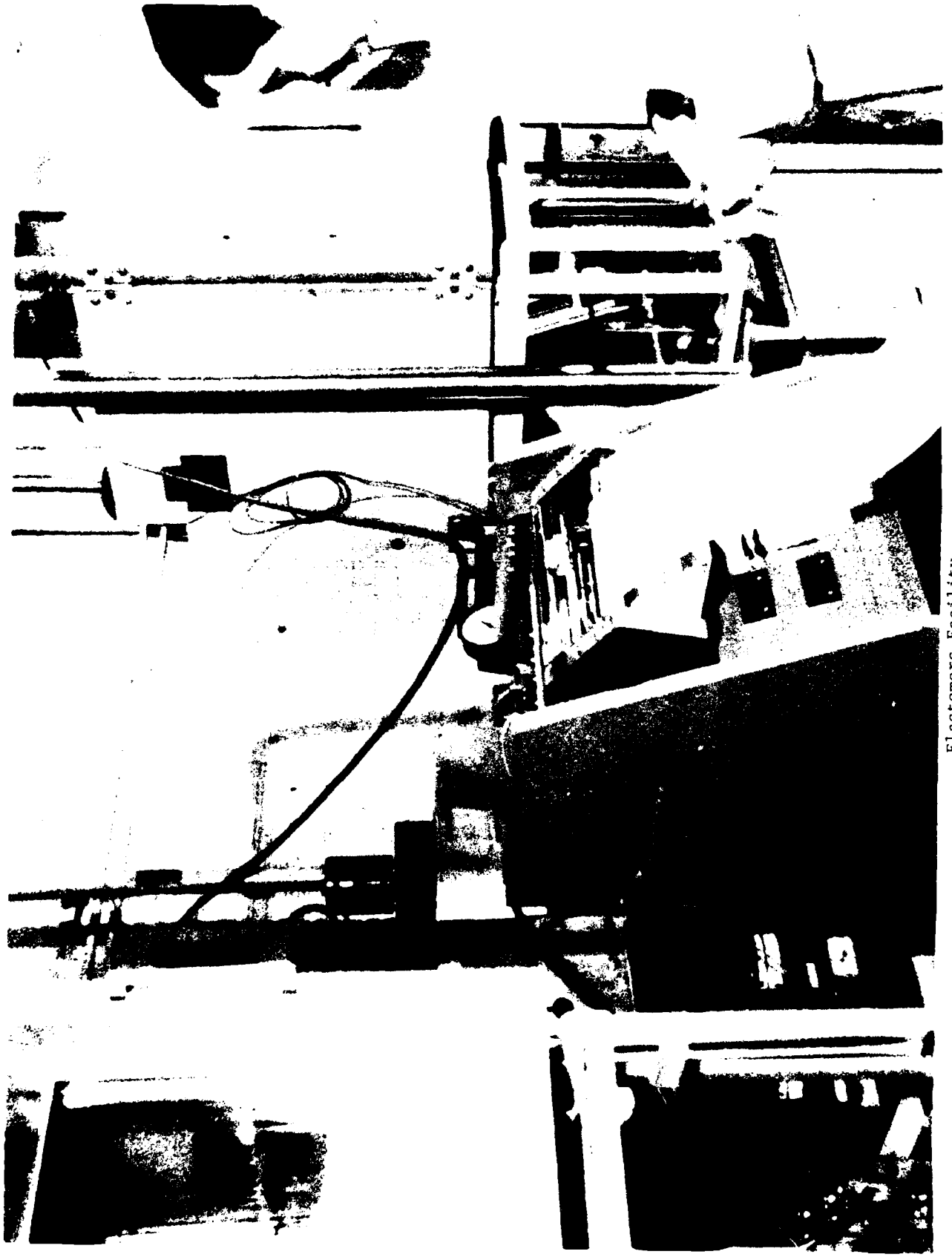
Two MTS Model 810 test cells for seal testing

AVAILABILITY:
Available to U.S. Government agencies

Limited industrial use

LOCATION:
BUILDING: 654 ROOM: 3,103

POINT OF CONTACT:
WRDC/MLBT
WPAFB, OH 45433-6533
(513) 255-9016
AV 785-9016



Elastomers Facility

FACILITY TYPE:
Fluid and Lubricant Research

PURPOSE:
Provide advanced fluid and lubricant materials technology for advanced systems

FACILITY NAME:
Fluid and Lubricant Development, Characterization, and Validation Facility

PRIMARY CAPABILITIES:
Synthesis and characterization of advanced lubricants and additives

Computational chemistry and tribological modeling

Prototype fluid formulation and assessment

Validation of candidate fluids and lubricants over anticipated temperature ranges in mechanical components, e.g., hydraulic pumps, bearing rigs, etc.

SPECIAL/UNIQUE CAPABILITIES:

INSTRUMENTATION:
Materials analysis and characterization facility; -65 degF., to 800 degF rheological property test facility; 600 degF., 8000 psi hydraulic pump test stand

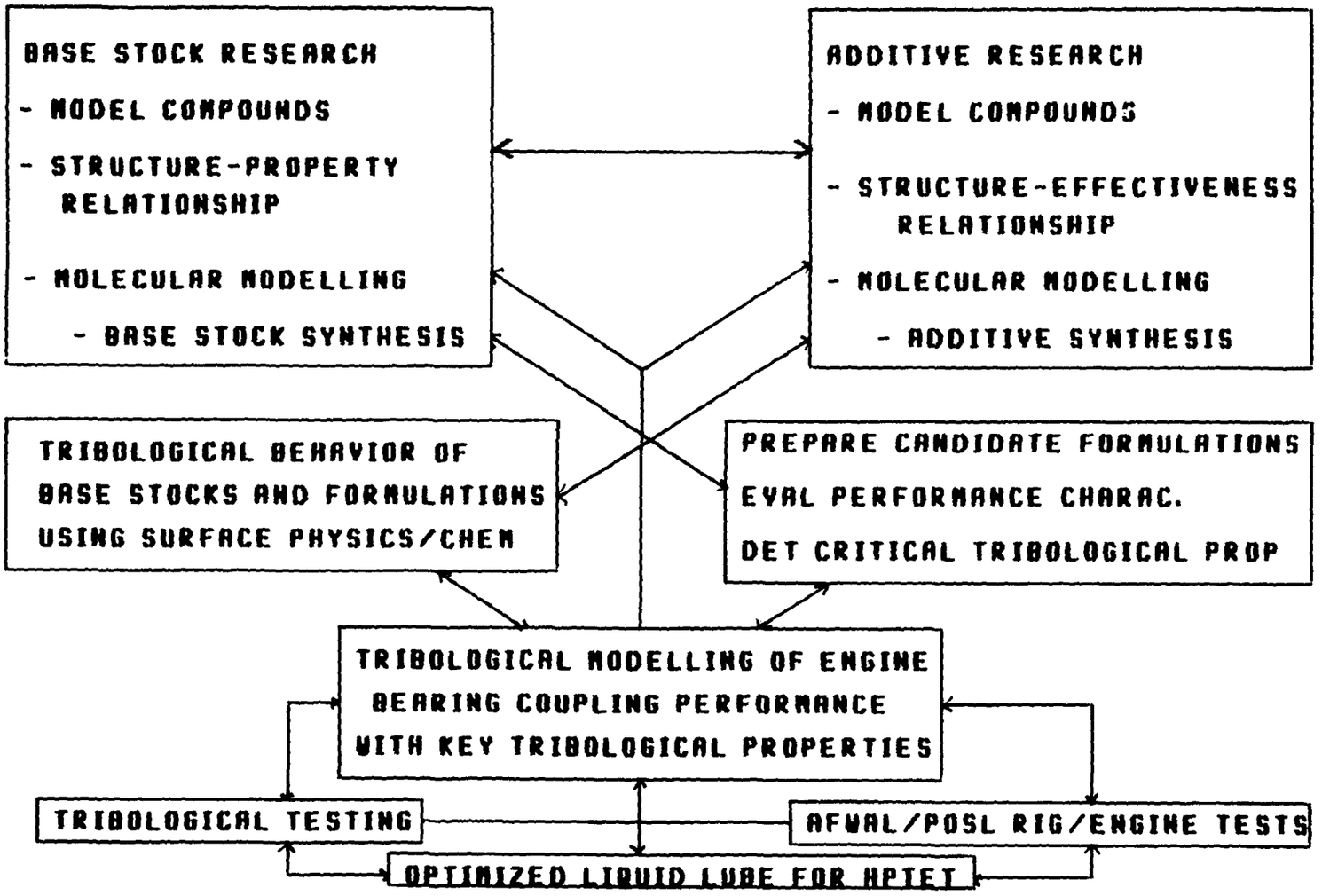
High temperature bearing test rigs; wide temperature range (-40 degF. to 400 degF.) bearing test rigs

Small scale traction test rig for advanced lubricants; thermal/oxidative stability (to 800 degF.) characterization facility

AVAILABILITY:
Available to U.S. Government agencies

LOCATION:
BUILDING: 654 ROOM: 1st Fl

POINT OF CONTACT:
WRDC/MLBT
WPAFB, OH 45433-6533
(513) 255-9036
AV 785-9036



Fluid and Lubricant Development, Characterization, and Validation Facility

FACILITY TYPE:
Space Combined Environment

PURPOSE:
Determine effects of space environment on radiative (optical) properties of exterior spacecraft thermal control materials

FACILITY NAME:
Space Combined Effects Primary Test Research Equipment (SCEPTRE)

PRIMARY CAPABILITIES:
Test and evaluate exploratory coatings and thermal control materials in a simulated space environment

Provide environment including high vacuum (5x10-8 Torr), ultraviolet radiation (0.1 to 3.0 EUVS),

and simultaneous electron irradiation (max Flux: 10 exp 12 -e/cm2/sec from 0.1 to 20.0 KeVs)

SPECIAL/UNIQUE CAPABILITIES:
Simultaneous electron/UV irradiation

Fiber optically coupled in-situ measurement of reflectivity

INSTRUMENTATION:
Spectrophotometer; spectroradiometer

Solar simulator; computer control/acquisition

Two mass spectrometers; programmable electrometer/source; two electron guns; pressure and temperature gauges

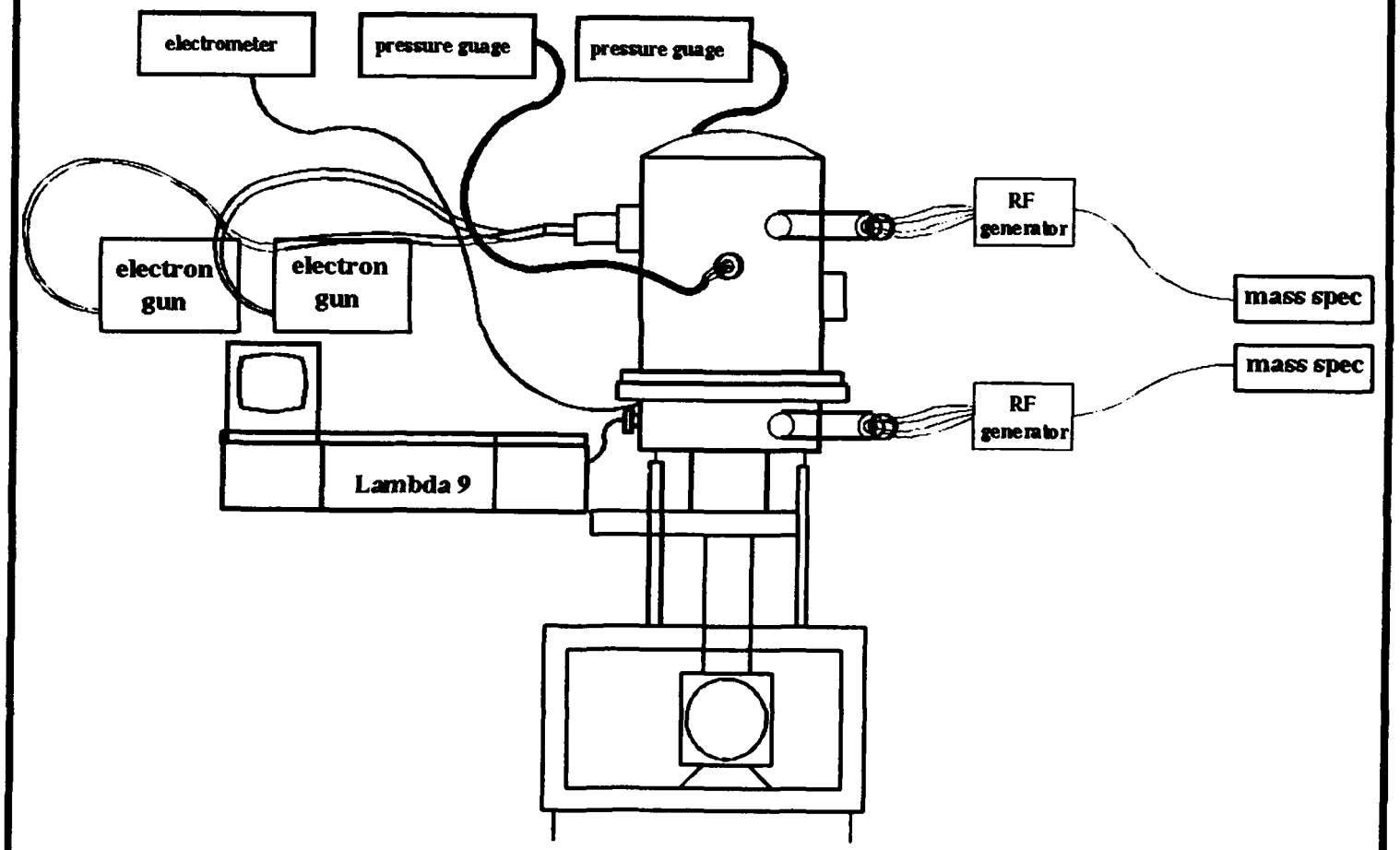
AVAILABILITY:
Primarily in-house research

Available to US Government agencies

LOCATION:
BUILDING: 654 ROOM: 104

POINT OF CONTACT:
WRDC/MLBT
WPAFB, OH 45433-6533
(513) 255-9022
AV 785-9022

SCEPTRE Facility



FACILITY TYPE:
High temperature materials synthesis and testing

PURPOSE:
Understand and develop new high temperature metallic and intermetallic materials for aerospace systems

FACILITY NAME:
High Temperature Materials Laboratory

PRIMARY CAPABILITIES:
Materials synthesis, high temperature heat treating, high temperature mechanical characterization, and high temperature structural character ization

SPECIAL/UNIQUE CAPABILITIES:
High temperature mechanical testing (tension, compression, bending and creep) in inert environments to temperatures as great as 1500 deg C

Solidification processing (including directional solidification and crystal growth) of reactive metals from ceramicless levitated melt.

X-ray diffraction at high temperature (to 1500 deg C); Heat treating in air or inert environments to temperatures in excess of 2000 deg C

INSTRUMENTATION:
Crystallox MCGS-5 multipurpose solidification processing system

Rigaku automated, rotating anode source, high temperaute X-Ray diffractometer

Mechanical testing frames outfitted with controlled environmental chambers, furnaces, and tooling for tensile, creep, bending, and compression testing at 1500C

AVAILABILITY:
Primarily in-house research; Available to U.S. government agencies, contractors

Also universities on space available/noninterference basis

LOCATION:
BUILDING: 655 ROOM:

POINT OF CONTACT:
WRDC/MLLM
WPAFB, OH 45433-6523
(513) 255-9821
AV 785-9821

High Temperature Materials Laboratory

FACILITY TYPE:
Ceramic and composite research

PURPOSE:
Develop understanding of ceramic composites for high temperature structural applications

FACILITY NAME:
Ceramic Composite Research Laboratory

PRIMARY CAPABILITIES:
Chemical synthesis of ceramic precursors

Fiber/matrix interface control

Composite fabrication

Specialized composite testing

SPECIAL/UNIQUE CAPABILITIES:
Interface property testing

Sol-Gel and Chemical Vapor Deposition (CVD) fiber coating

INSTRUMENTATION:
2000 degC air furnace

2500 degC vacuum hot press

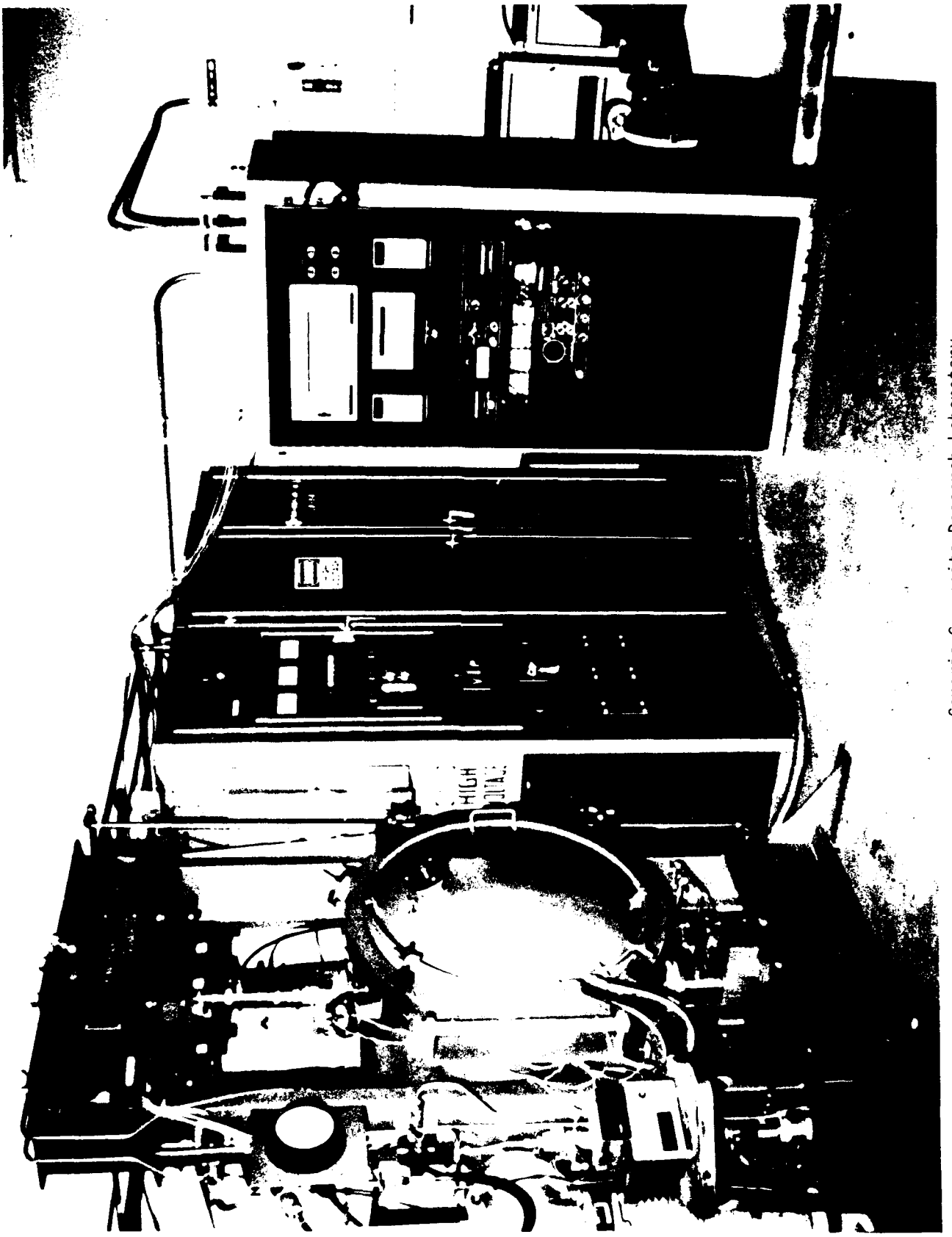
Fiber push-out test stand

AVAILABILITY:
Primarily in-house

Limited availability to government agencies, industry and contractors

LOCATION:
BUILDING: 655 ROOM:

POINT OF CONTACT:
WRDC/MLLM
WPAFB, OH 45433-6533
(513) 255-9823
AV 785-9823



Ceramic Composite Research Laboratory

FACILITY TYPE:
Materials Processing

PURPOSE:
Develop improved aerospace materials processing

FACILITY NAME:
Experimental Materials Processing Laboratory

PRIMARY CAPABILITIES:
Extrusion, forging, rolling, and swaging

Casting of small quantities

Heat treatment

Welding; vacuum arc melting

SPECIAL/UNIQUE CAPABILITIES:
Computer-aided process modeling; CAD/CAM; data acquisition

Link to 4950th Test Wing

Only pilot scale equipment in the U.S. dedicated to research

INSTRUMENTATION:
CAD/CAM terminal; process modeling software

700 ton extrusion and forge press

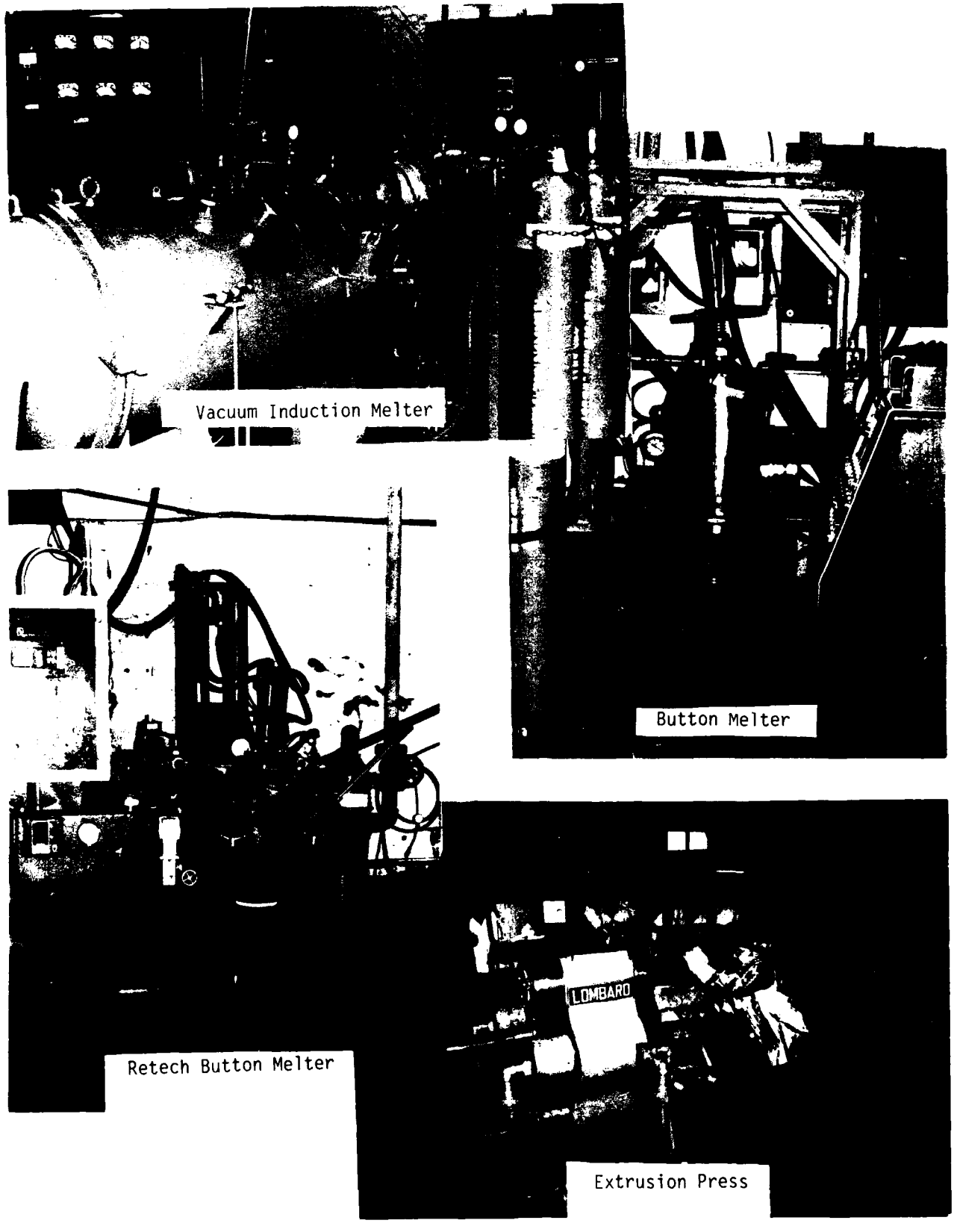
Vacuum arc melters

AVAILABILITY:
Available to U.S. Government agencies and contractors

Limited industrial use

LOCATION:
BUILDING: 51 ROOM:

POINT OF CONTACT:
WRDC/MLLM
WPAFB, OH 45433-6533
(513) 255-9835
AV 785-9835



Experimental Materials Processing Lab

FACILITY TYPE:
Mechanical Testing

PURPOSE:
Evaluate mechanical properties of materials under typical loading conditions for advanced aerospace applications

FACILITY NAME:
Materials Behavior Testing Laboratory

PRIMARY CAPABILITIES:
Computer controlled fatigue and fatigue crack growth testing at elevated temperature

High frequency and low cycle fatigue of metals and composites

Creep, fatigue, and thermal-mechanical fatigue of high temperature metallic and ceramic composite materials

SPECIAL/UNIQUE CAPABILITIES:
Fully automated fatigue crack growth capability using extensometers, electric potential, and laser interferometer methods for crack length/closure determination

High-temperature, computer controlled thermo-mechanical fatigue of high temperature composites; High vacuum (10^-10) torr) capability

Unique data acquisition and data processing programs

INSTRUMENTATION:
State-of-the-art elevated temperature fatigue instrumentation, temperature control and measurement, and laser and optical displacement measurement systems

AVAILABILITY:
Exclusively for in-house research

LOCATION:
BUILDING: 655 ROOM:

POINT OF CONTACT:
WRDC/MLLN
WPAFB, OH 45433-6563
(513) 255-1347
AV 785-1347

Materials Behavior Testing Laboratory

FACILITY TYPE:
NDE X-ray computed tomography

PURPOSE:
Establish applicability of x-ray computed tomography (CT) to meet critical NDE requirements; develop novel material and structural characterization techniques

FACILITY NAME:
Materials Laboratory X-Ray CT Facility

PRIMARY CAPABILITIES:
Specialization in the area of NDE x-ray CT for quantitative imaging of the internal structure of advanced materials and components

Parameters measured are density, atomic number and internal dimensions

SPECIAL/UNIQUE CAPABILITIES:
Large area conventional x-ray CT (objects 20in DIA and 34in H) with 0.01in resolution

Dual energy CT and radiography for chemical analysis and laminography for imaging of laminar structures

Microfocus CT for small objects (4in DIA and 8in H) with 0.001in resolution, also with laminography capabilities.

INSTRUMENTATION:
Laminography/dual energy x-ray CT system

Microtomography x-ray CT system (Available April 1990)

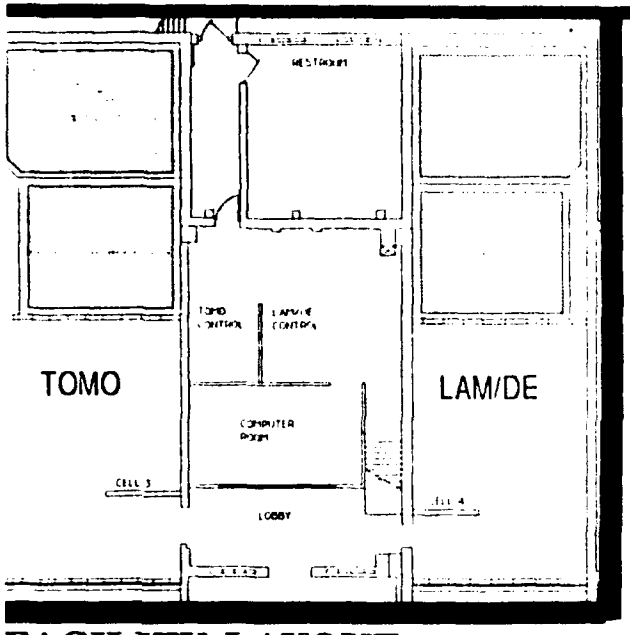
AVAILABILITY:
Primarily in-house research; available to U.S. government agencies

Available to university and industrial researchers on a non-interference basis

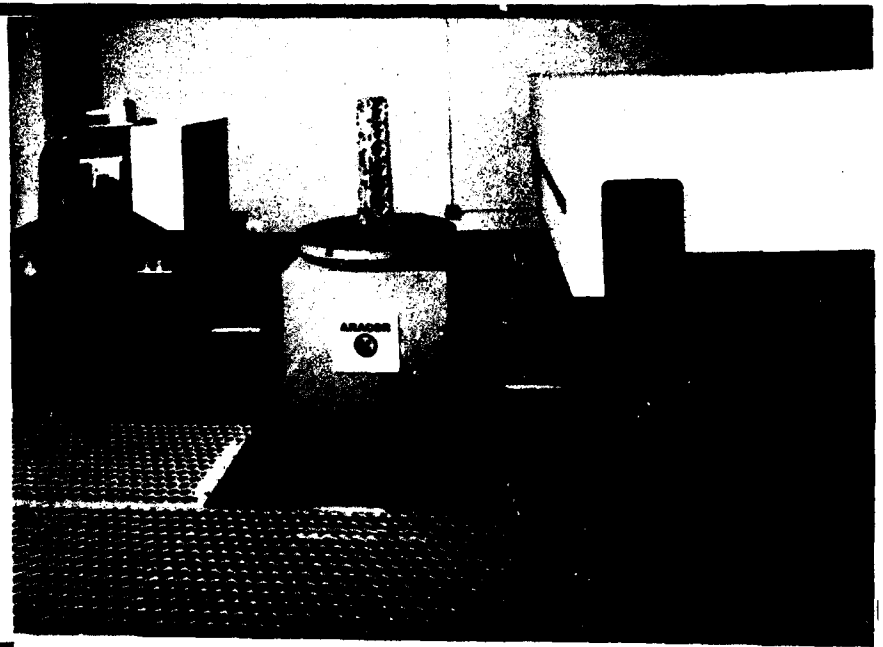
LOCATION:
BUILDING: 71 ROOM:

POINT OF CONTACT:
WRDC/MLLP
WPAFB, OH 45433-6533
(513) 255-9802
AV 785-9802

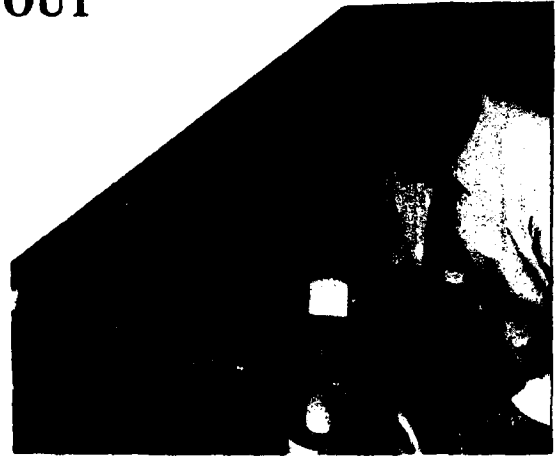
MATERIALS LABORATORY
COMPUTED TOMOGRAPHY
RESEARCH FACILITY



FACILITY LAYOUT



LAMINOGRAPHY / DUAL ENERGY (LAMDE)



MICROTOMOGRAPHY (TOMO)

FACILITY TYPE:
Non-Destructive Evaluation (NDE) research

PURPOSE:
Investigate and develop novel NDE methods and their supportive functions to meet critical needs of advanced materials, processes and structures

FACILITY NAME:
Materials Laboratory NDE In-House Research Facility

PRIMARY CAPABILITIES:
Specialization in the area of ultrasonic and thermal wave NDE development

Signal and image processing methodology for discrete imaging of defects in advanced materials and structures, and anomaly analysis

SPECIAL/UNIQUE CAPABILITIES:
Automated ultrasonic scanning equipment with macro and micro scale resolution down to 0.001 inch capability

Digitization capabilities for discrete signal acquisition and analysis

Thermal wave imaging of micro scale defects in small specimens

INSTRUMENTATION:
Large area ultrasonic system

Small specimen ultrasonic system

Thermal wave imaging system

AVAILABILITY:
Primary in-house research; universities and industry on non-interference basis

Available to U.S. government agencies

LOCATION:
BUILDING: 655 ROOM:

POINT OF CONTACT:
WRDC/MLLP
WPAFB, OH 45433-6533
(513) 255-9802
AV 785-9802

Materials Lab NDE In-House Research Facility

FACILITY TYPE:
Electron optics

PURPOSE:
Characterize advanced research materials utilizing electron microscopy and develop innovative microstructural characterization techniques

FACILITY NAME:
Materials Characterization Facility (Electron Optics Laboratory)

PRIMARY CAPABILITIES:
Specialization in the area of analytical microscopy for determining the orientation, volume fraction, crystal structure and composition of microscopic phases

SPECIAL/UNIQUE CAPABILITIES:
Analytical electron microscopy including transmission and scanning imaging and electron diffraction on metallic, organic composite and ceramic materials

Compositional X-ray analysis including both energy dispersive and wavelength dispersive spectroscopy

Fractographic analysis to determine the failure mechanisms of materials

INSTRUMENTATION:
Scanning Transmission Electron Microscope (STEMs and TEMs)

Field Emission Microscopes and Scanning Electron Microscopes

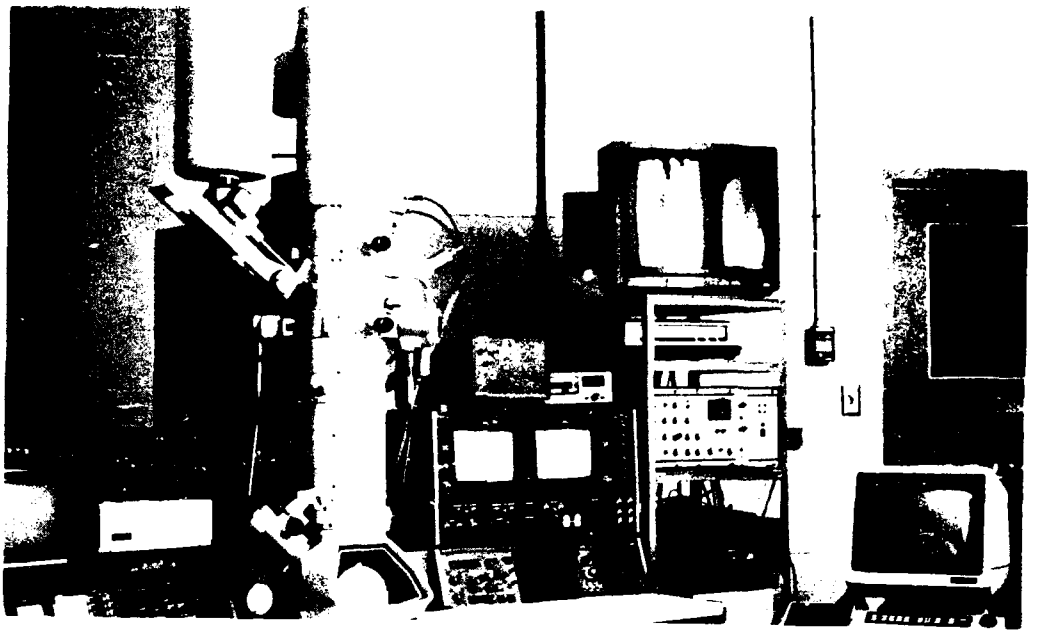
Electron microanalyzer/microprobe

AVAILABILITY:
Primarily in-house research

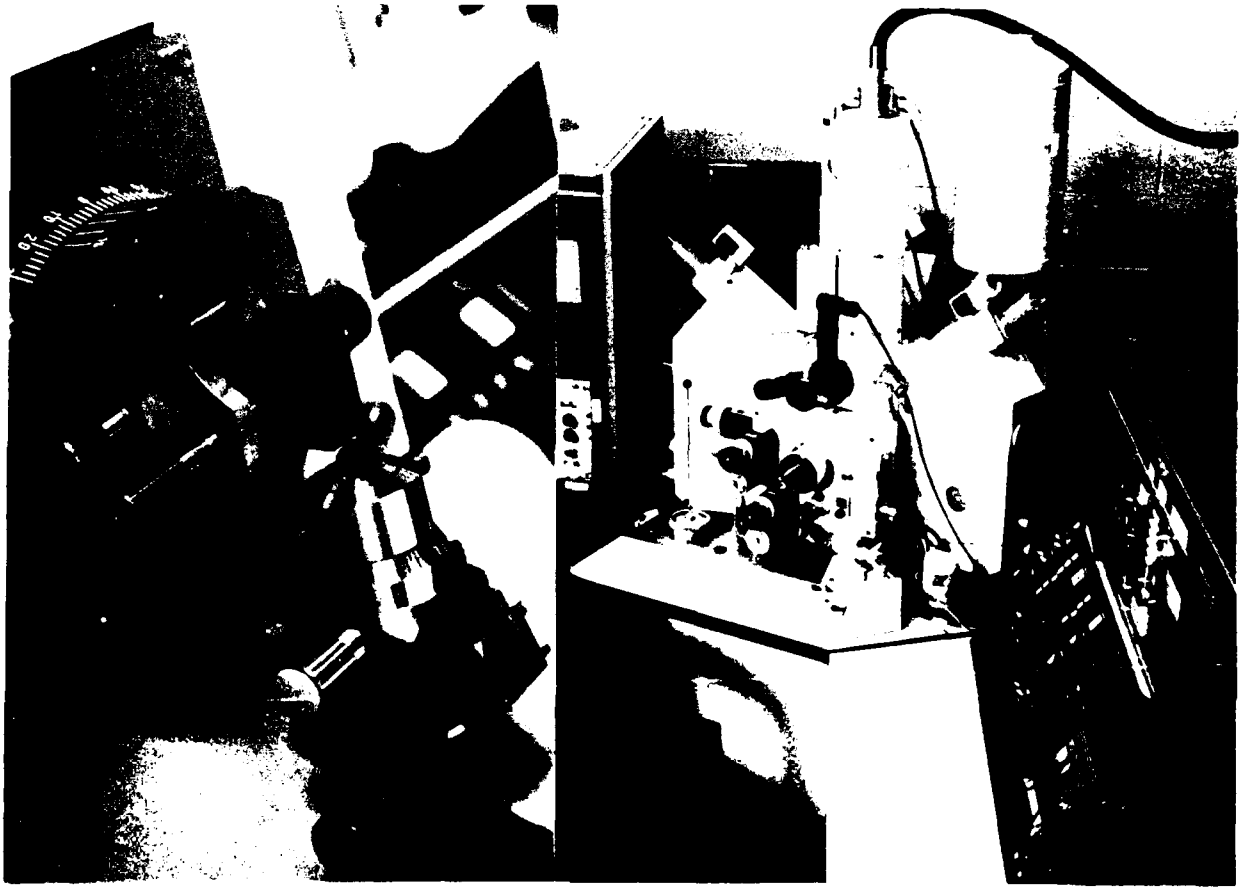
Available to U.S. Government agencies

LOCATION:
BUILDING: 655 ROOM: 064B

POINT OF CONTACT:
WRDC/MLLS
WPAFB, OH 45433-6533
(513) 255-1314
AV 785-1314



SCANNING TRANSMISSION ELECTRON MICROSCOPE



MICROTOME

ELECTRON MICROPROBE

Material Characterization Facility
(Electron Microscopy Laboratory)

FACILITY TYPE:
Metallography

PURPOSE:
Perform optical microscopic characterization of materials and develop new specimen preparation and examination techniques

FACILITY NAME:
Materials Characterization Facility (Metallography Laboratory)

PRIMARY CAPABILITIES:
Optical microscopy quantitative characterization, and metallographic specimen preparation on metallics, nonmetallics, metal and ceramic composites

SPECIAL/UNIQUE CAPABILITIES:
Quantitative Metallography; Interference Microscopy

Nomarski Imaging; Roper Analytical Research Electropolishing (RARE) System

High Energy Rapid Electropolishing (HERE) System

INSTRUMENTATION:
Light optical microscopes; Research metallographs

Image analysis system; Microhardness testers; Electropolishers

AVAILABILITY:
Primarily in-house research

Available to U.S. government agencies

LOCATION:
BUILDING: 655 ROOM:

POINT OF CONTACT:
WRDC/MLLS
WPAFB, OH 45433-6533
(513) 255-1314
AV 785-1314

IMAGE ANALYSIS SYSTEM

SPECIMEN PREPARATION LAB

AUTOMATED ELECTROPOLISHER

Materials Characterization Facility
(Metallography Laboratory)

FACILITY TYPE:
Metallurgy

PURPOSE:
Increase basic knowledge of metallurgical processing for controlling the microstructure and mechanical properties of metallic aerospace alloys and composites

FACILITY NAME:
Metallurgical Research Laboratory

PRIMARY CAPABILITIES:
Heat treatment of metals in air and vacuum

Vacuum hot pressing including uniaxial and isostatic pressure

Advanced processing, novel metallic alloys and composites

SPECIAL/UNIQUE CAPABILITIES:
Heat treatment including annealing, quenching and aging of advanced titanium alloys for improved high temperature performance

Material processing including rapid solidification technology (RST) and metal matrix composites (MMC)

Hot consolidation of advanced powder metallurgy (P/M) RST alloys and advanced titanium MMC material

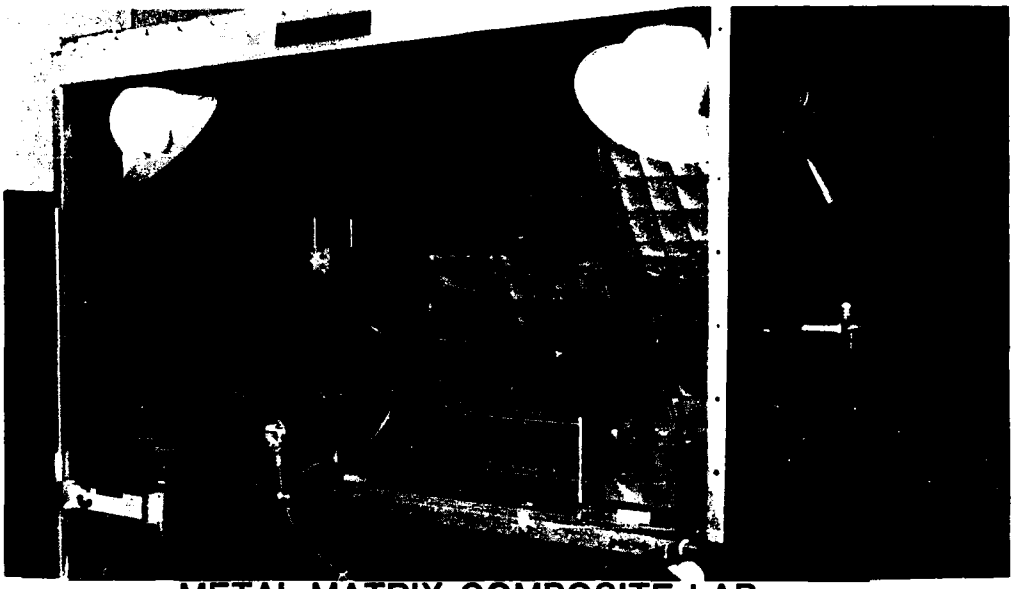
INSTRUMENTATION:
Vacuum heat treating

Hot isostatic pressing

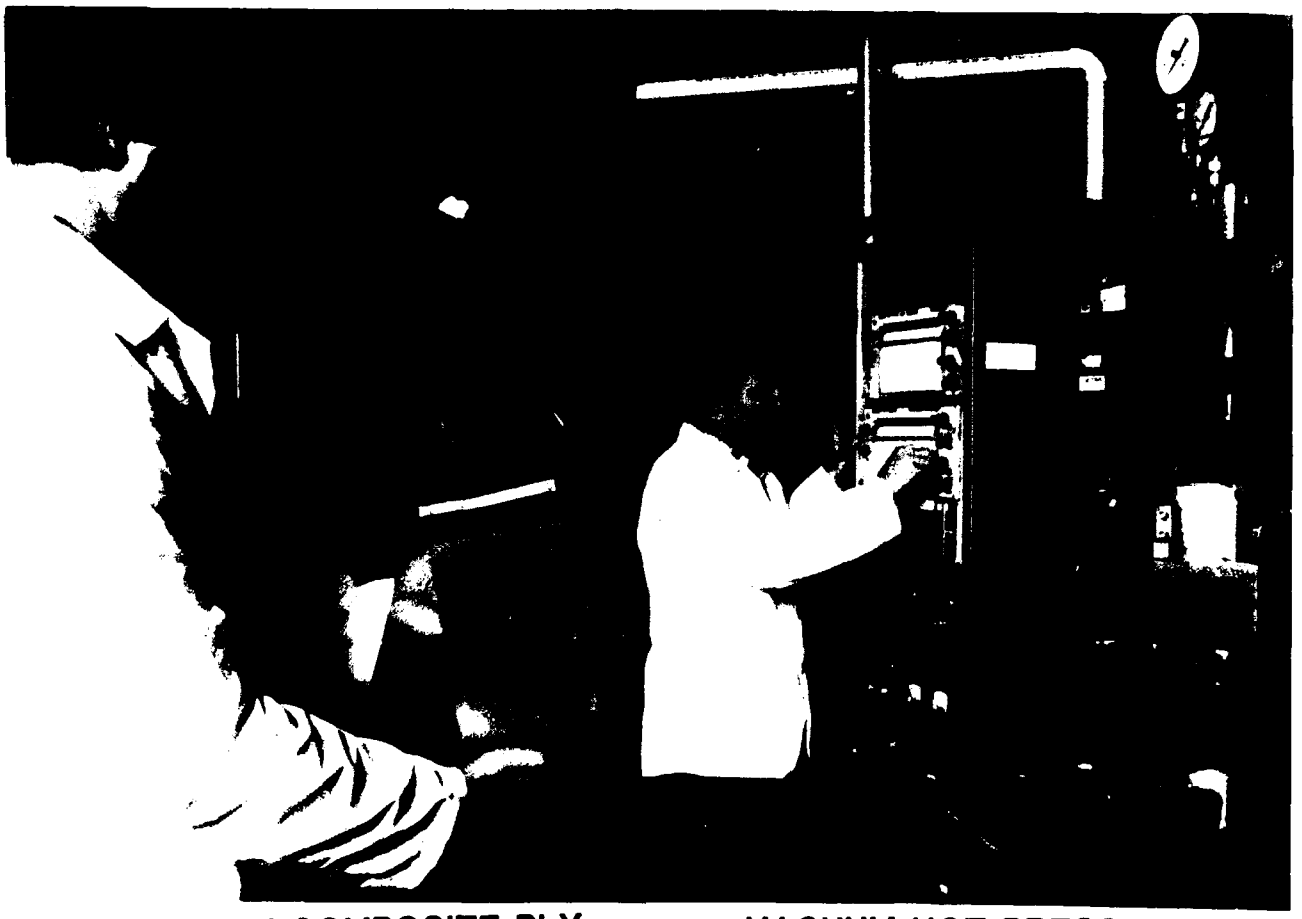
AVAILABILITY:
Primarily in-house research

LOCATION:
BUILDING: 655 ROOM:

POINT OF CONTACT:
WRDC/MLLS
WPAFB, OH 45433-6533
(513) 255-1313
AV 785-1313



METAL MATRIX COMPOSITE LAB



TITANIUM COMPOSITE PLY VACUUM HOT PRESS

FACILITY TYPE:
15 KW laser: Flat-top beam

PURPOSE:
Evaluate laser/materials interactions and effects on advanced materials for future aerospace applications

FACILITY NAME:
Laser Hardened Materials Evaluation Laboratory I (LHMEL I)

PRIMARY CAPABILITIES:
15KW, continuous wave, carbon dioxide laser; run time of 10 sec at 15KW (nominal)

Average 30 air tests/day or 15 vacuum tests/day

Well characterized flat-top beam

1 to 11 cm spot sizes

SPECIAL/UNIQUE CAPABILITIES:
Vacuum environment test chamber (10 exp -4 Torr)

Dielectric material test chamber with microwave test set

50 Kpsi tensile test machine; subsonic blow-down wind tunnel

INSTRUMENTATION:
Burn-through detector; high-speed cameras (16mm)

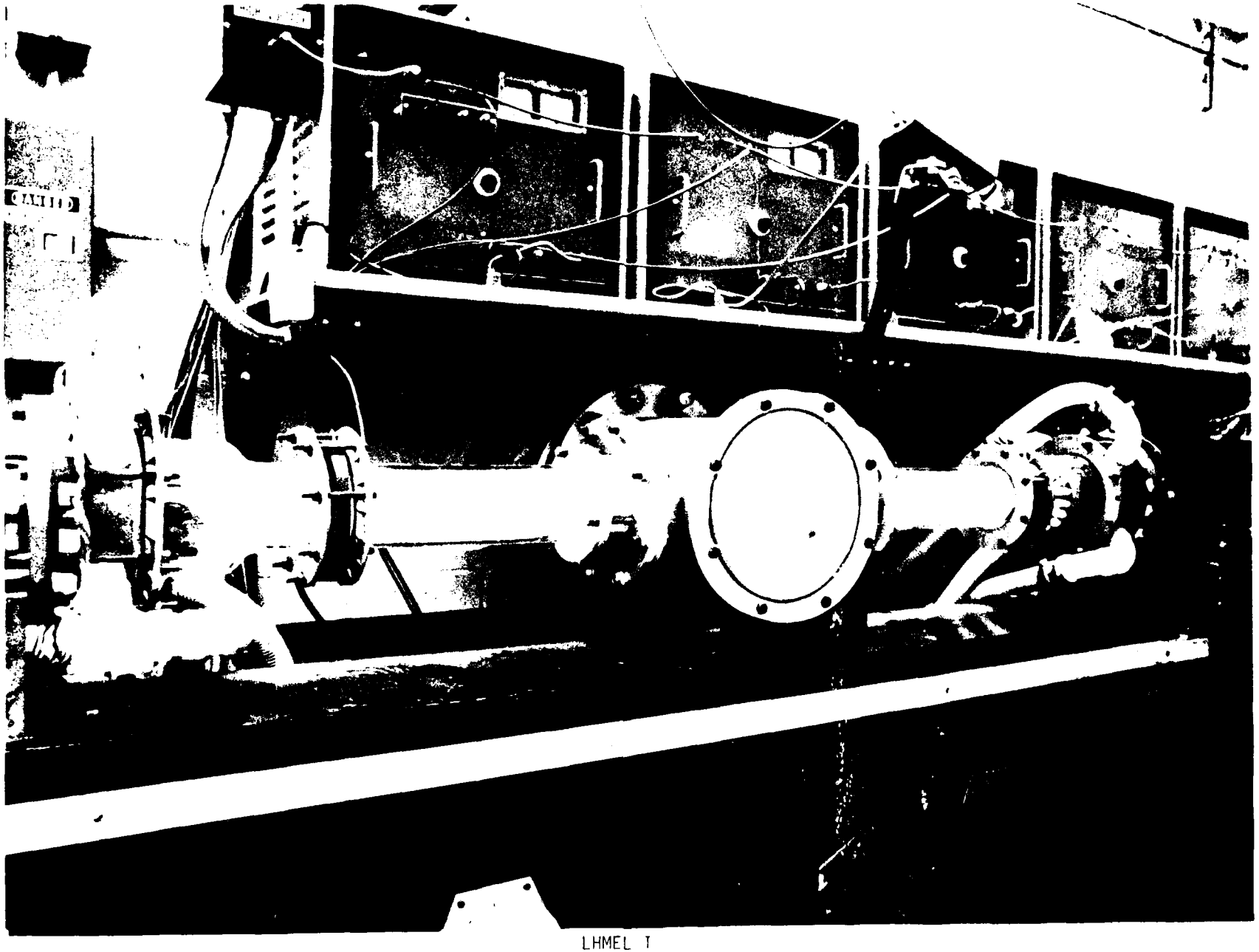
Pyrometers; Honeywell Visicorder strip chart recorder

VHS Cassette recording for closed circuit TV; still photography

AVAILABILITY:
Available to US Government agencies and contractors

LOCATION:
BUILDING: 71A ROOM:

POINT OF CONTACT:
WRDC/MLPJ
WPAFB, OH 45433-6533
(513) 255-2334
AV 785-2334



LHMEL T

FACILITY TYPE:
100+ KW laser: Flat-top beam

PURPOSE:
Provide cost effective, well characterized, reliable laser for materials response phenomenology, geometric scaling, and sub-scale component testing

FACILITY NAME:
Laser Hardened Materials Evaluation Laboratory II (LHMEL II)

PRIMARY CAPABILITIES:
100+ KW, Continuous Wave, Carbon Dioxide Laser

Run time up to 100 seconds

Flat-top beam

1 to 50+ cm spot sizes

SPECIAL/UNIQUE CAPABILITIES:
7 ft by 9 ft chamber (to 1x10-6 Torr)

Wind tunnel, subsonic

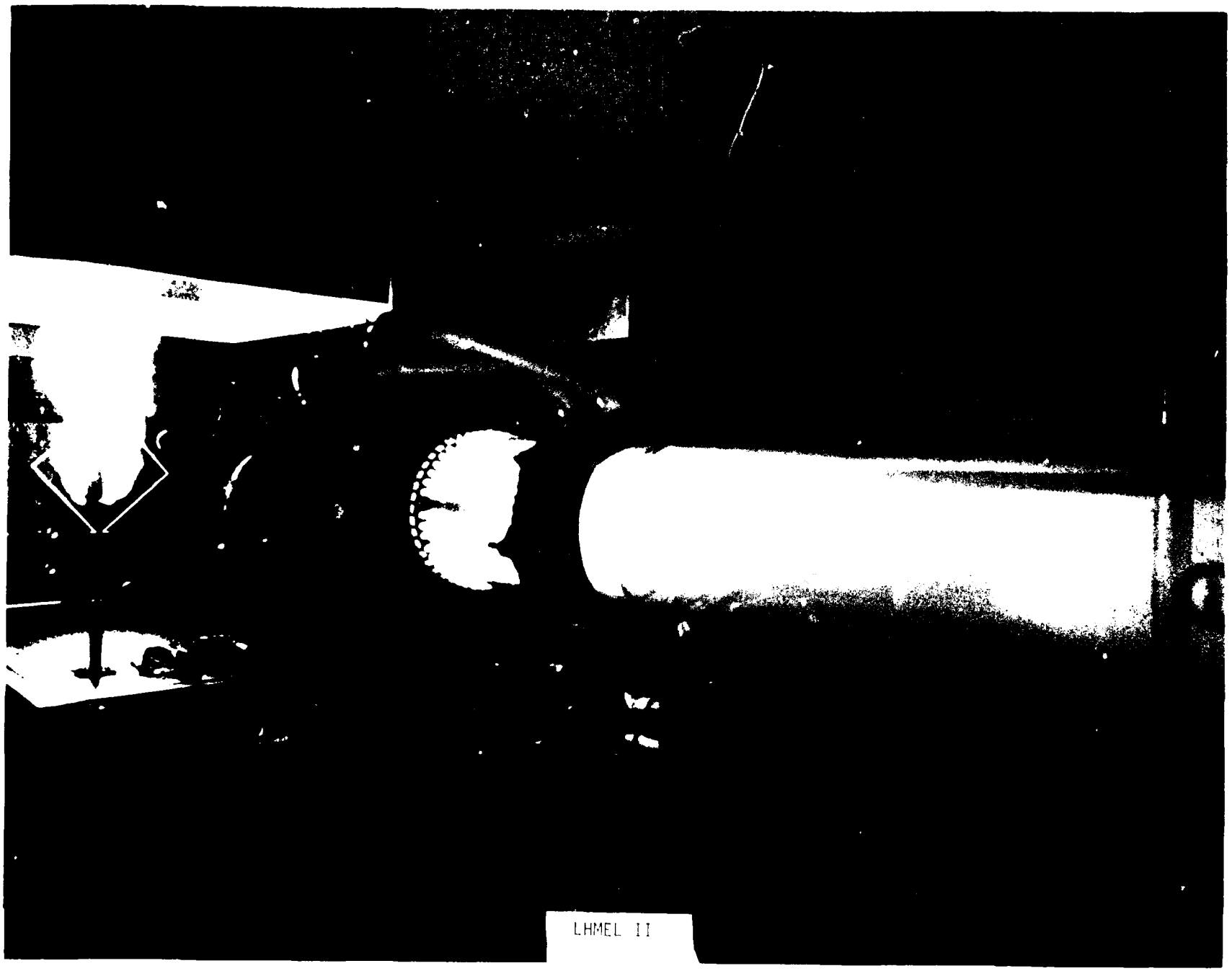
INSTRUMENTATION:
High and low speed cameras (16mm); still photography; CC TV coverage (VHS); IR camera and Thermal Imaging System; pyrometers; burn through detectors

Beam diagnostics (power-on-target, spatial, and temporal profiles); data acquisition system (200+ channels)

AVAILABILITY:
Available to U.S. Government agencies and contractors

LOCATION:
BUILDING: 71A ROOM:

POINT OF CONTACT:
WRDC/MLPJ
WPAFB, OH 45433-6533
(513) 255-2334
AV 785-2334


LHMEL II

FACILITY TYPE:
Chemical analysis

PURPOSE:
Perform chemical analyses on metallic and nonmetallic materials in support of research programs and current systems

FACILITY NAME:
Analytical Support Facility

PRIMARY CAPABILITIES:
Material identification

Multiple testing capabilities

SPECIAL/UNIQUE CAPABILITIES:
In support of accident investigations

Quick reaction response, on-site problem solving of unique, complex material compositions

INSTRUMENTATION:
Infrared spectroscopy, FTIR capability, Emission Spectroscopy, Atomic Absorption

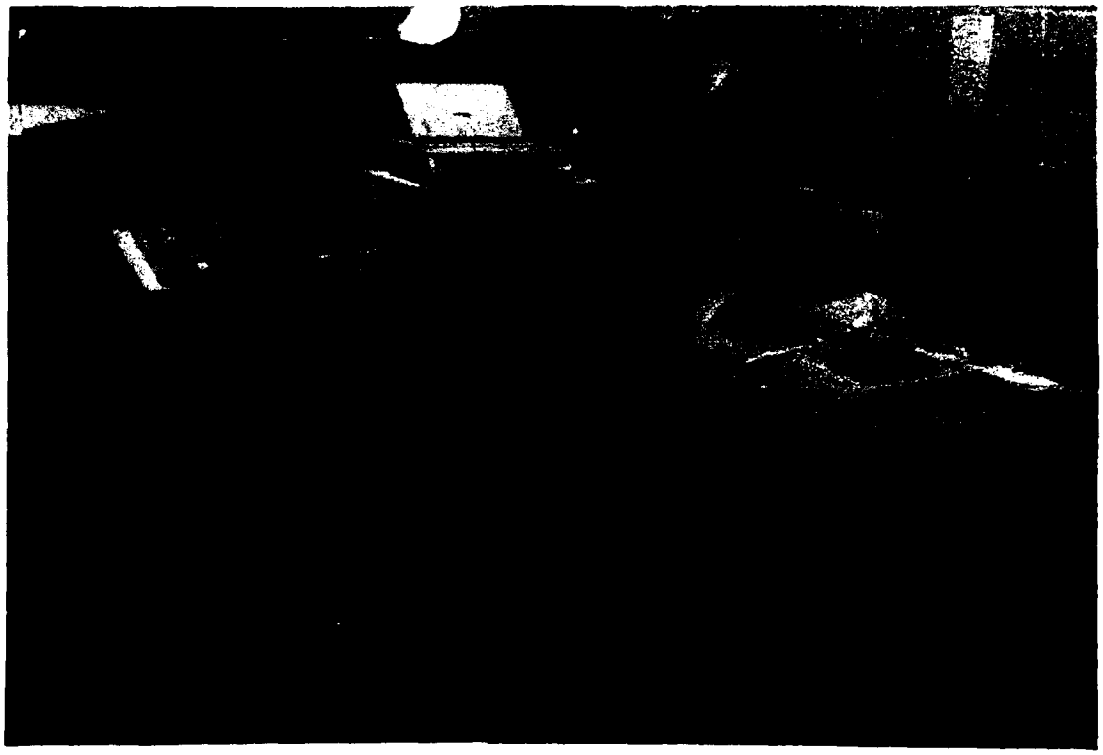
Mass Spectrometry, Micro-Elemental Analysis, X-Ray Diffraction

AVAILABILITY:
Available to U.S. Government agencies

Available to NATO Defense Organizations

LOCATION:
BUILDING: 651 ROOM:

POINT OF CONTACT:
WRDC/MLSA
WPAFB, OH 45433-6533
(513) 255-3623
AV 785-3623



Analytical Support Facility

FACILITY TYPE:
Failure Analysis

PURPOSE:
Detect and analyze failures in electrical and electronic equipment

FACILITY NAME:
Electronic Failure Analysis Facility

PRIMARY CAPABILITIES:
Identify and analyze electronic failures

Investigate materials selections

Investigate manufacturing process defects

Investigate accidents

SPECIAL/UNIQUE CAPABILITIES:
Special interface with ALCs

Unique capabilities for |SPOs

Many contacts with industry

INSTRUMENTATION:
Electrical parameterization , analog and digital

Scanning electron microscope,electron beam probing and voltage phase contrast of hybrid circuits

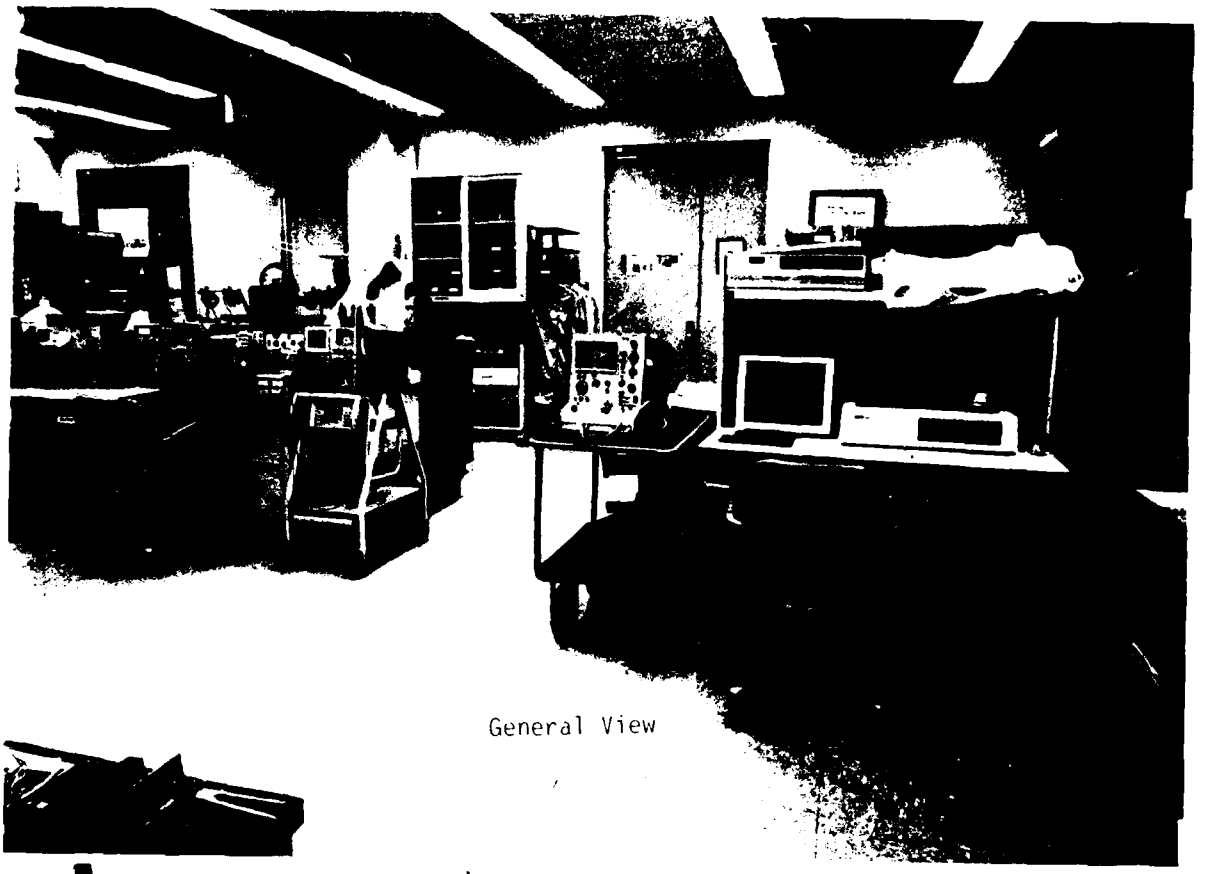
Accelerated life testing/environmental cycling

AVAILABILITY:
Available to U.S. Government agencies

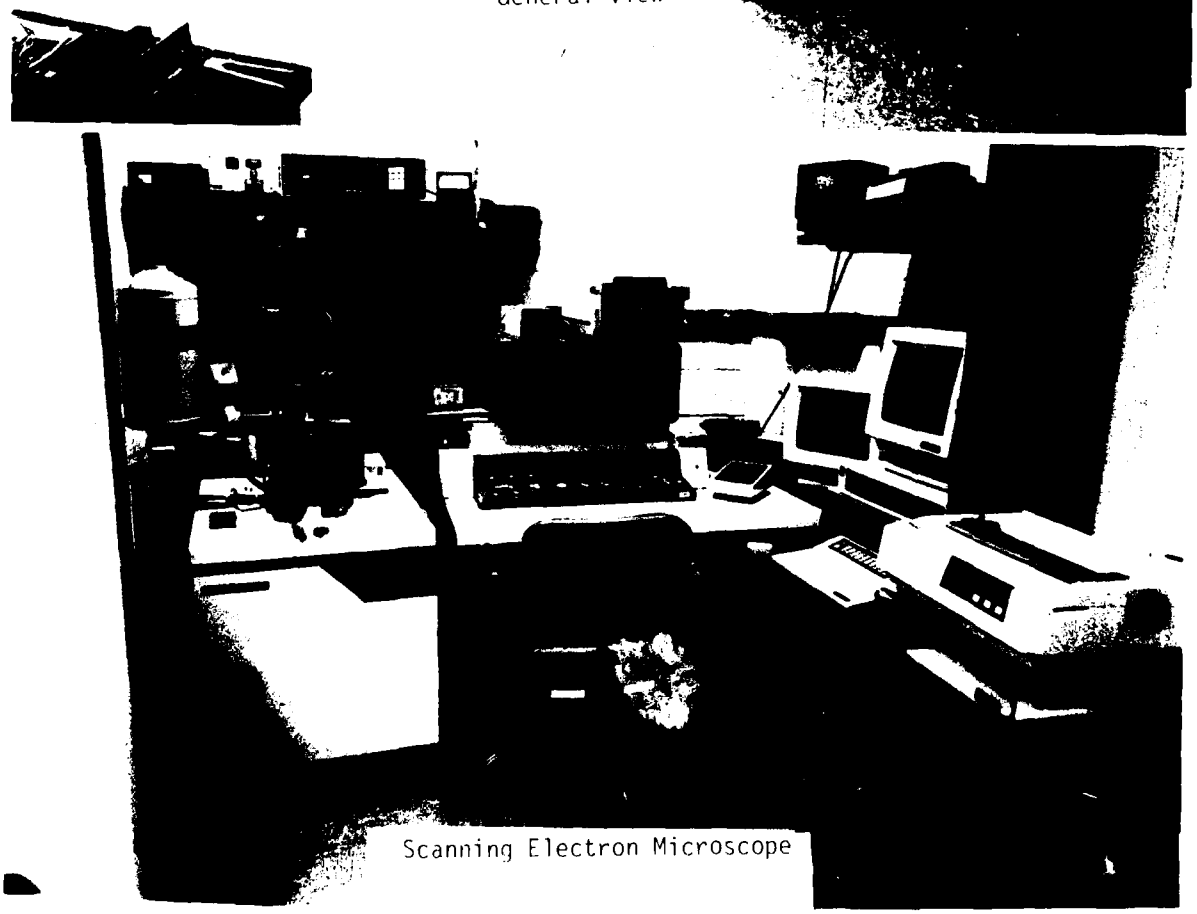
Available to NATO Defense Organizations

LOCATION:
BUILDING: 652 ROOM: 17,47

POINT OF CONTACT:
WRDC/MLSA
WPAFB, OH 45433-6533
(513) 255-3487
AV 785-3487



General View



Scanning Electron Microscope

Electronic Failure Analysis Facility

FACILITY TYPE:
Structural Materials Investigation

PURPOSE:
Perform material analyses of failed metallic and nonmetallic structural components

FACILITY NAME:
Failure Analysis Facility

PRIMARY CAPABILITIES:
Fracture mode identification

Metallurgical studies of all types of materials

Investigation of composite structures

Analysis of duplex structures

SPECIAL/UNIQUE CAPABILITIES:
Quick reaction accident investigation capability

On-site problem solving capability as well as off-site

Composite material fracture characterization

INSTRUMENTATION:
Metallography; hardness testers

Light optic microscopes; electron optic microscope

Thermal testing devices

AVAILABILITY:
Available to U.S. Government agencies

Available to NATO Defense Organizations

LOCATION:
BUILDING: 652 ROOM: 28

POINT OF CONTACT:
WRDC/MLSA
WPAFB, OH 45433-6533
(513) 255-3623
AV 785-3623

Failure Analysis Facility

FACILITY TYPE:
Rain Erosion

PURPOSE:
Test and evaluate materials and structures in hostile weather environments

FACILITY NAME:
Mach 1.2 Rain Erosion Test Facility

PRIMARY CAPABILITIES:
Variable velocity capability

Controlled duration exposure

Aircraft and missile components and materials

R&D materials

SPECIAL/UNIQUE CAPABILITIES:
Real time observation of erosion mechanisms; calibrated rainfield simulation

Classified capabilities

Support development of new materials; baseline data comparisons; qualification of proprietary materials/structures

INSTRUMENTATION:
Closed circuit television observation

Extensive monitoring of materials performance

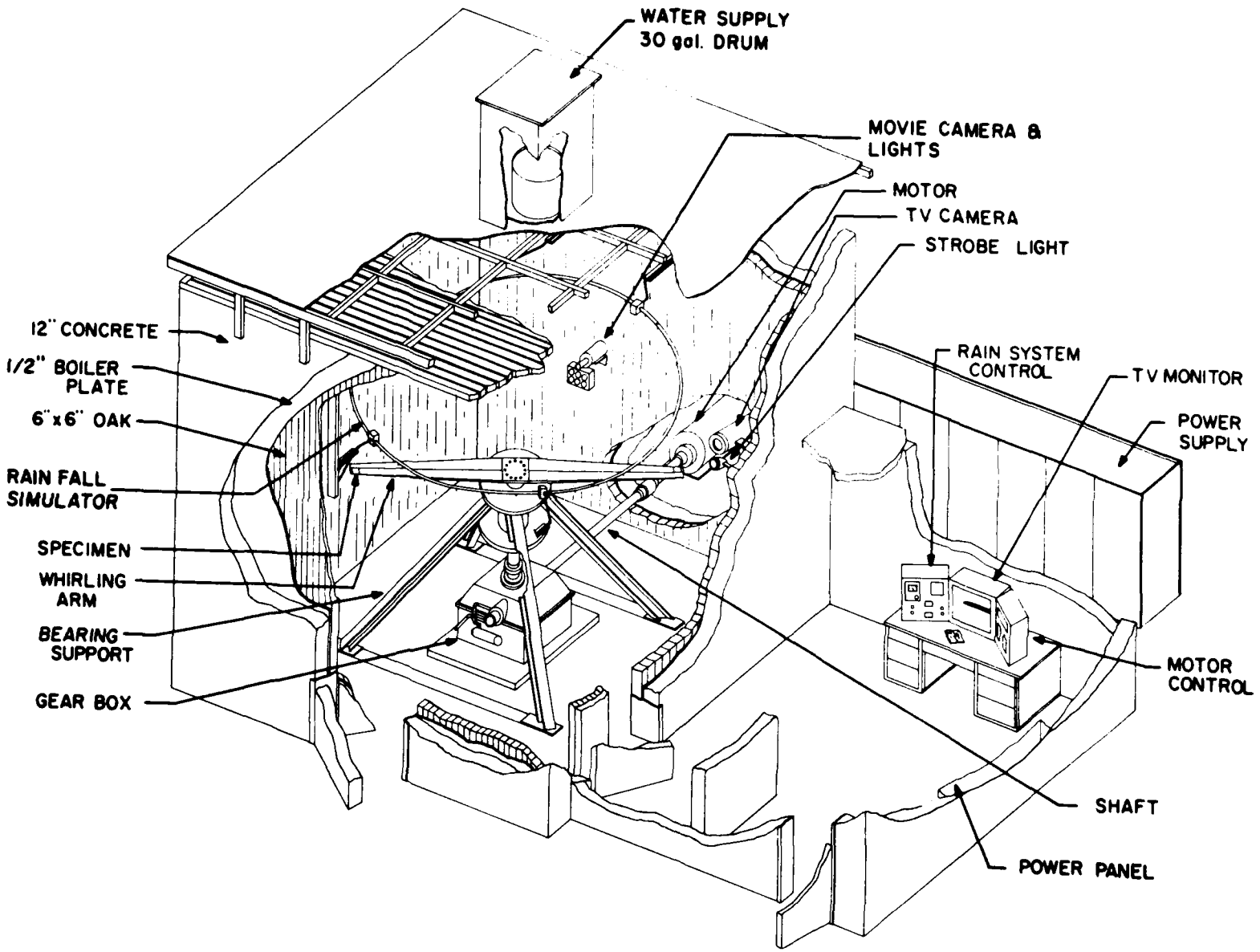
Laboratory evaluation instrument (optical, electrical); video tape capability

AVAILABILITY:
Available to U.S. Government agencies and contractors

Available to industry

LOCATION:
BUILDING: 20A ROOM:

POINT OF CONTACT:
WRDC/MLSA
WPAFB, OH 45433-6533
(513) 255-3637
AV 785-3637



Mach 1.2 Rain Erosion Test Facility

FACILITY TYPE:
Corrosion/Materials Compatibility/Coatings

PURPOSE:
Corrosion testing, materials compatibility, surface pretreatment, surface finishing, process chemicals, and aerospace maintenance chemicals

FACILITY NAME:
Materials Compatibility/Coatings Test Facility

PRIMARY CAPABILITIES:
Standardized testing; specification testing

Accelerated environmental simulation

New material/process screening

Multiple testing capabilities; corrosion testing and evaluation

SPECIAL/UNIQUE CAPABILITIES:
Three different forms of artificial weathering

Accelerated aging capability (humidity, temperature extremes, fluid immersions)

Accelerated corrosion tests (salt spray, filiform, stress corrosion)

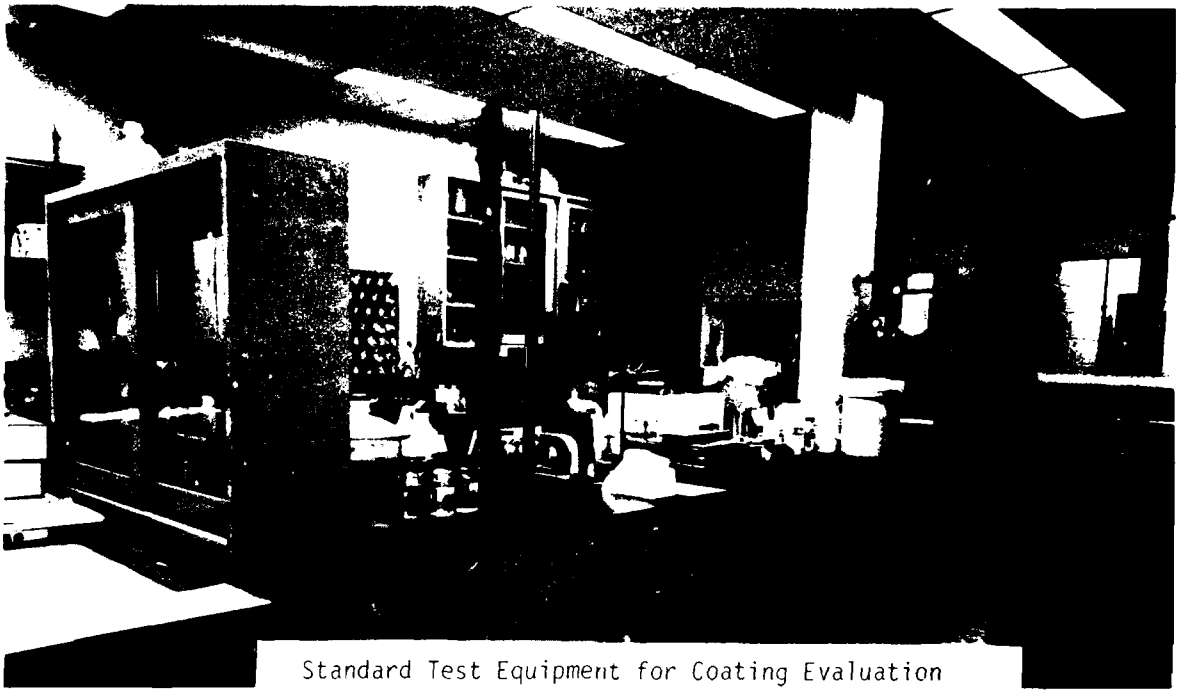
INSTRUMENTATION:
Extensive monitoring and processing of test parameter data and final result presentation

AVAILABILITY:
Available to U.S. Government agencies

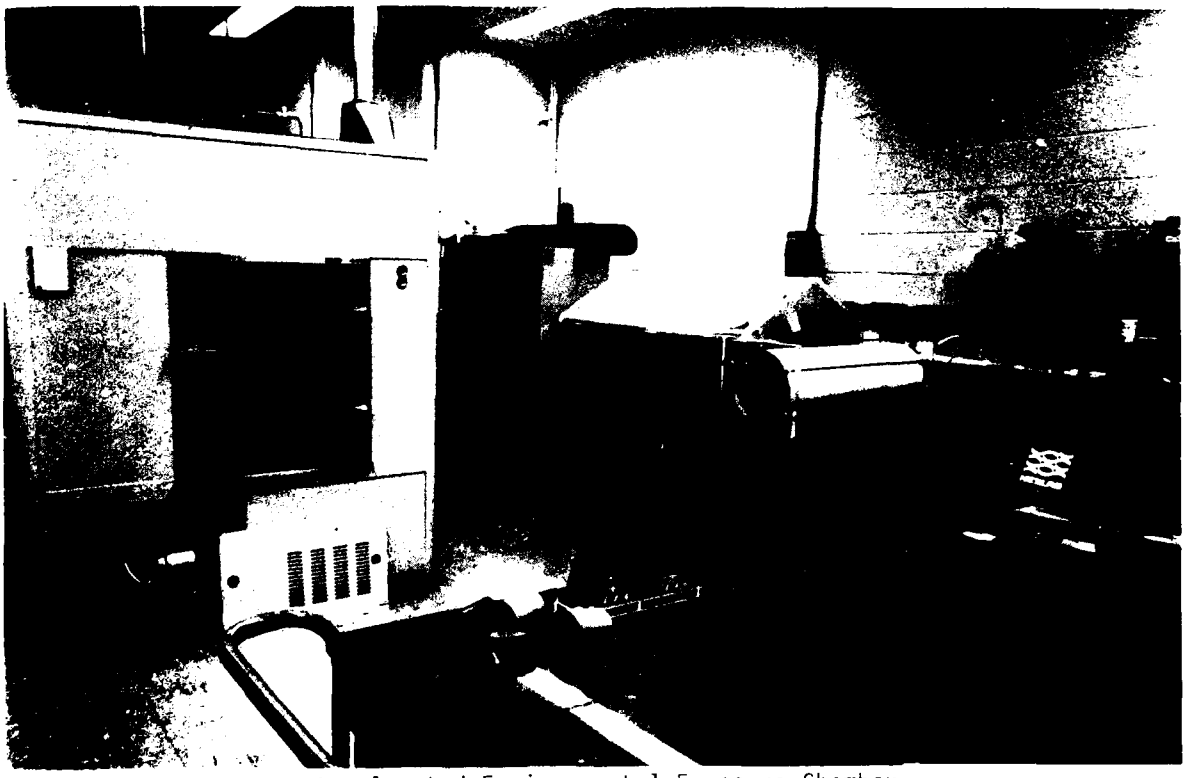
Available to Government contractors

LOCATION:
BUILDING: 652 ROOM: 51

POINT OF CONTACT:
WRDC/MLSA
WPAFB, OH 45433-6533
(513) 255-5117
AV 785-5117



Standard Test Equipment for Coating Evaluation



Accelerated Environmental Exposure Chamber

FACILITY TYPE:
Nondestructive Inspection

PURPOSE:
Characterize and/or detect defects in metallic and/or composite materials and/or structures

FACILITY NAME:
System Support Nondestructive Inspection Laboratory

PRIMARY CAPABILITIES:
Ultrasonic; eddy current; magnetic particle; penetrant

Radiography; acoustic emission; thermography; optical

SPECIAL/UNIQUE CAPABILITIES:
Portable and fixed laboratory capabilities for ultrasonic C-scan recordings and radiographic inspection

Only facility in the world authorized to evaluate sensitivity of penetrant inspection materials for DOD applications

INSTRUMENTATION:
Radiography - 5 to 320 KV; ultrasonics - 20 KHz to 20 MHz

Eddy currents - 10 Hz to 6 MHz (upon equipment arrival); acoustic emission, two sensor source locations

Pentrant/magnetic particle; UV lights, fixed or protable capability

AVAILABILITY:
Available to U.S. Government agencies

Available to Government contractors

LOCATION:
BUILDING: 652 ROOM: 42,43

POINT OF CONTACT:
WRDC/MLSA
WPAFB, OH 45433-6533
(513) 255-5117
AV 785-5117

System Support NDI Laboratory

FACILITY TYPE:
Mechanical Properties

PURPOSE:
Provide a quick reaction structural material evaluation capability

FACILITY NAME:
Engineering and Design Data Evaluation Facility

PRIMARY CAPABILITIES:
Conduct tensile, compression, bearing, shear, fatigue, fracture toughness, crack growth, impact, creep tests

Conduct stress rupture and stress corrosion cracking tests of materials

SPECIAL/UNIQUE CAPABILITIES:
Conduct tests to 3000 degF. in vacuum, inert gas and air

Complex spectrum loading for fatigue and crack growth evaluations

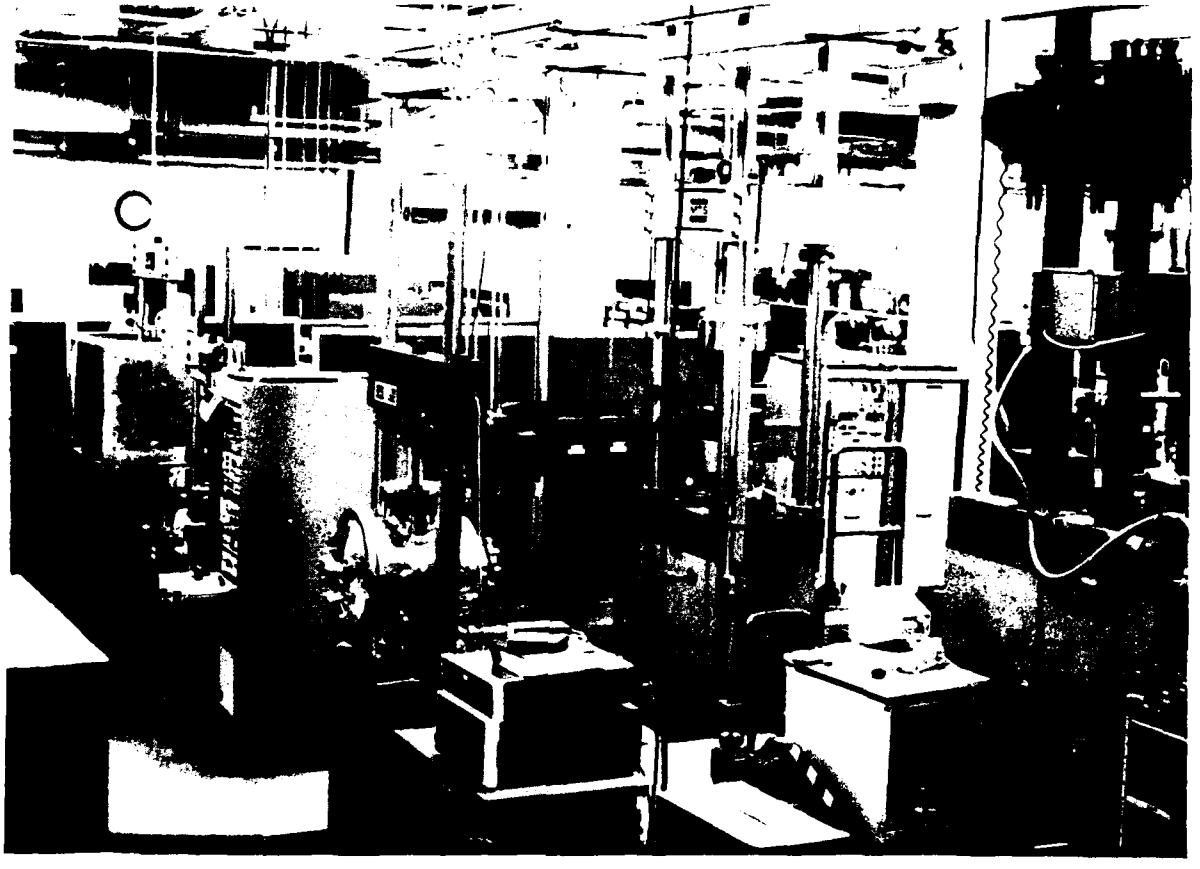
Controlled humidity chambers; liquid He cryogenic capability

INSTRUMENTATION:
Measure stress, strain, crack length, temperature and other appropriate parameters on a real time basis

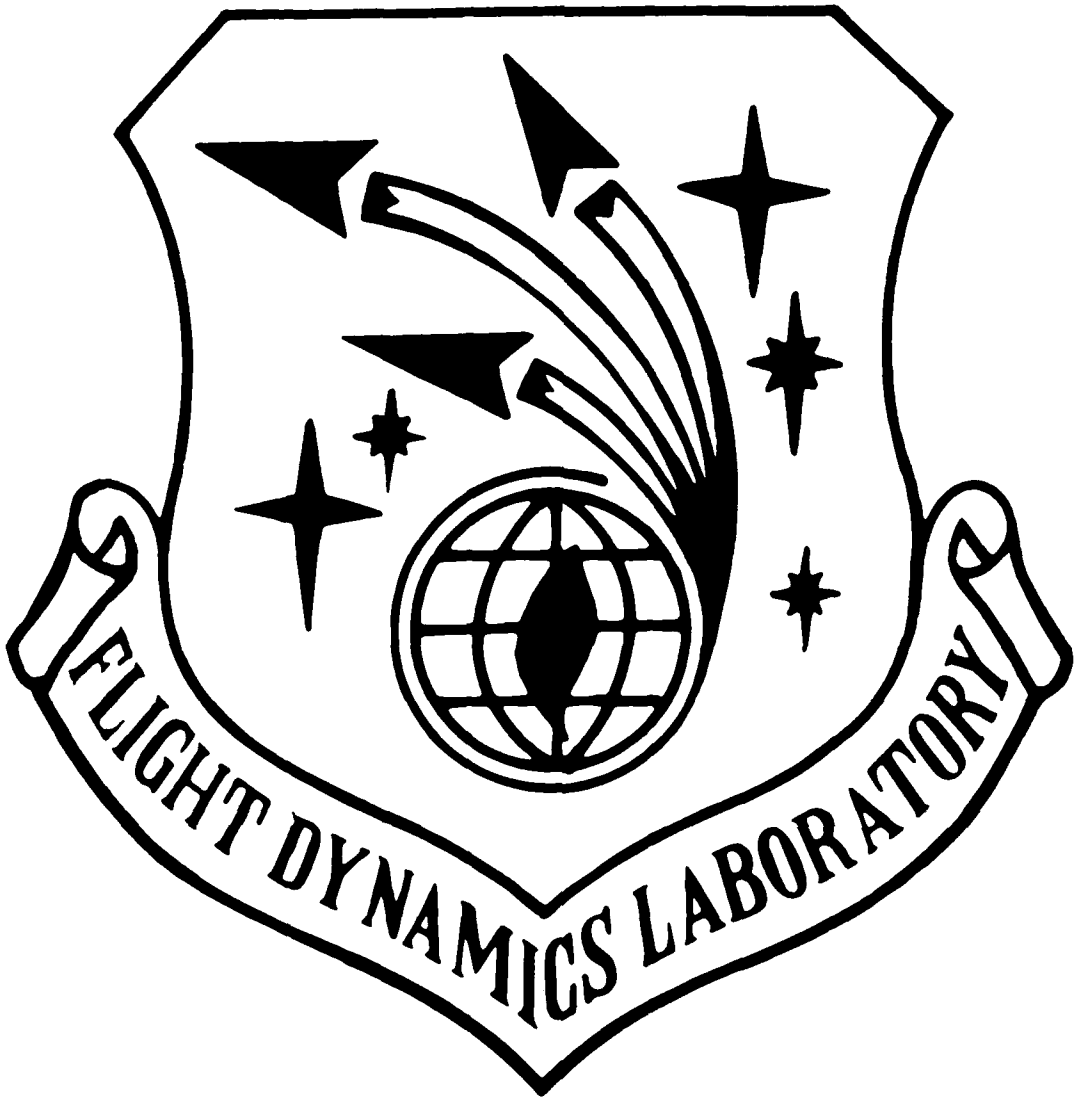
AVAILABILITY:
Available to U.S. Government agencies

LOCATION:
BUILDING: 652 ROOM: G-17

POINT OF CONTACT:
WRDC/MLSE
WPAFB, OH 45433-6533
(513) 255-5128
AV 785-5128



Engineering and Design Data Evaluation Facility


FLIGHT DYNAMICS LABORATORY

FACILITY TYPE:
Composite Structures Fabrication

PURPOSE:
Provide fabrication support to DOD and other Government agencies in the area of advanced materials structures

FACILITY NAME:
FIBC Composites Facility

PRIMARY CAPABILITIES:
Mold design, lay-up, autoclave and press cure, and machining of advanced composite parts and structures from ASTM spec test specimens to full scale structures

Specialization in the areas of high tolerance machining and bonding technology as applied to advanced composite and metallic materials

SPECIAL/UNIQUE CAPABILITIES:
Manufacturing capabilities include all industry standard thermoset and thermoplastic composite materials

Expert in standard and nonstandard surface preparation and bonding systems; two and three dimensional, variable geometries are standard projects

Prototype and first effort designs are the usual program

INSTRUMENTATION:
6'x18' 400 degF autoclave; 4'x8' 850 degF autoclave; abrasive waterjet cutting system; ASTM chemical analysis capabilities

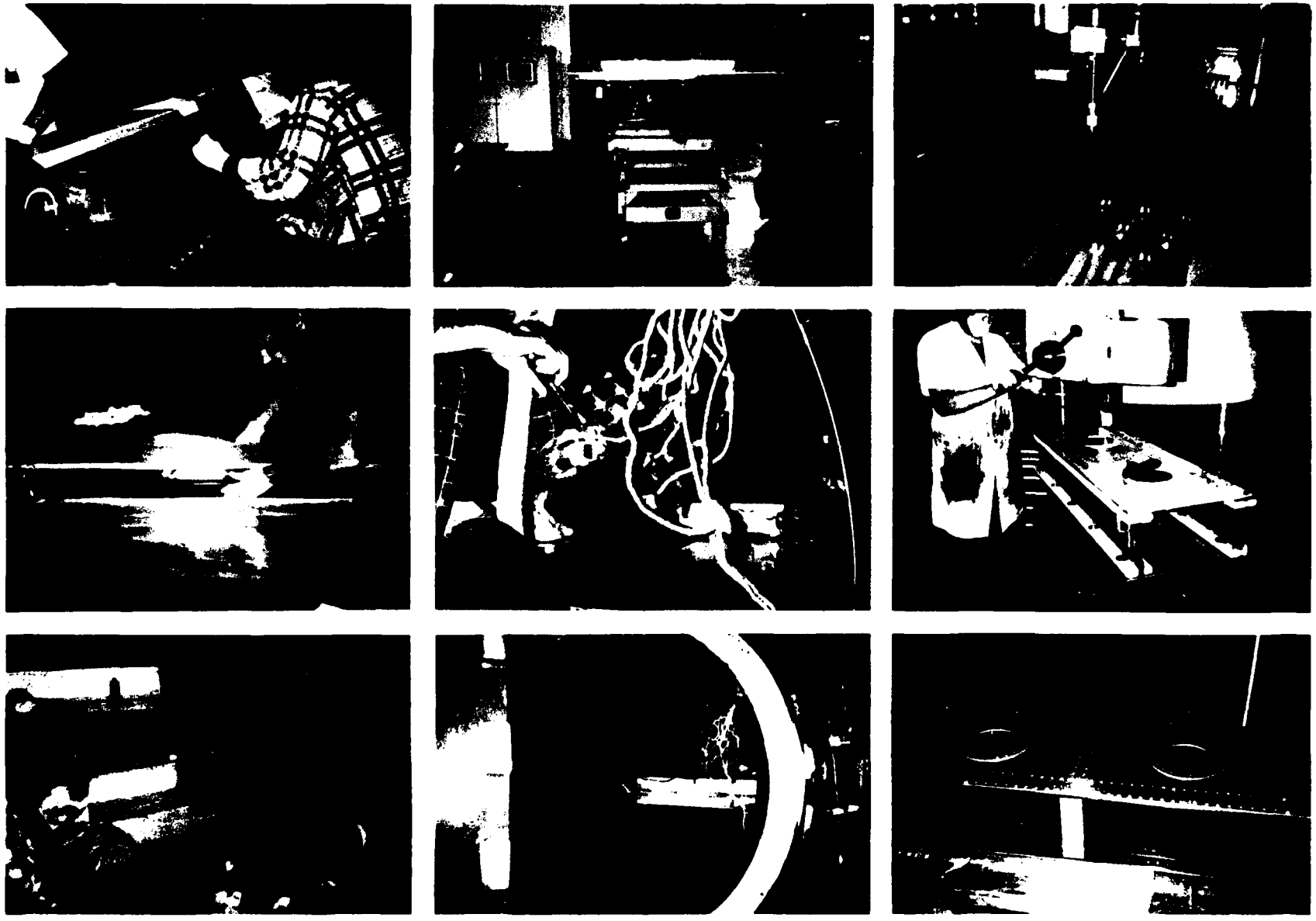
Vertical Dynatup impactor over a horizontal MTS, with 2M hz data acquisition system, for performing impact studies on composites while under mechanical preload

Complete capabilities for performing ASTM and nonstandard mechanical properties testing; fully equiped machine shop

AVAILABILITY:
Available to U.S. Government agencies and some foreign nations

LOCATION:
BUILDING: 65 ROOM: 300N

POINT OF CONTACT:
WRDC/FIBC
WPAFB, OH 45433-6553
(513) 255-6658
AV 785-6658



FIBC Composites Facility

FACILITY TYPE:
Aircraft Structures Test Facility

PURPOSE:
Study structural materials fatigue

FACILITY NAME:
Fatigue and Fracture Laboratory

PRIMARY CAPABILITIES:
Test and validate new materials to ensure life and damage tolerance

SPECIAL/UNIQUE CAPABILITIES:
Develop hot-structures test capability

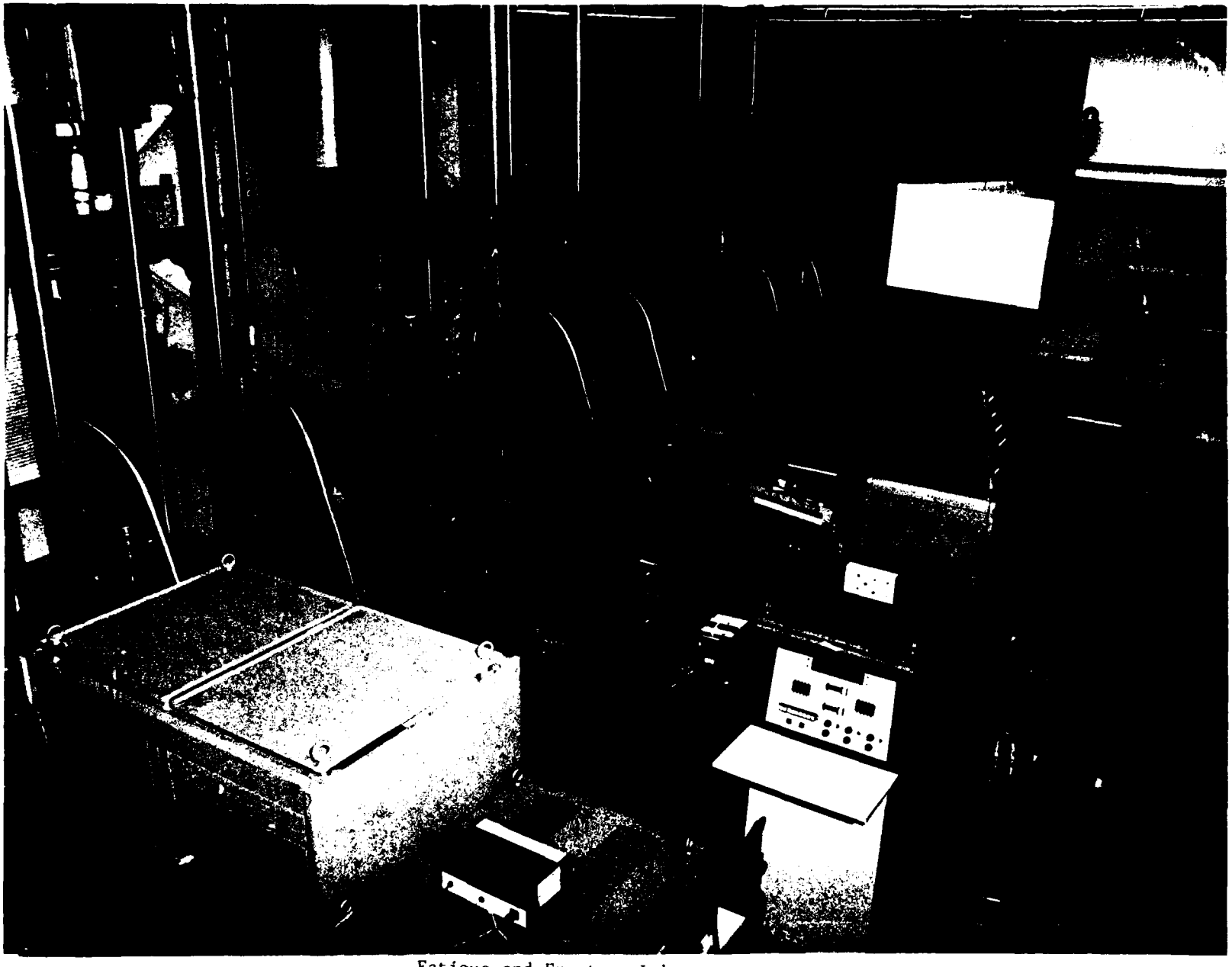
INSTRUMENTATION:
Computer controlled test machines with automatic crack-growth measuring capability

AVAILABILITY:
Primarily in-house research

Limited use by U.S. Government agencies and contractors

LOCATION:
BUILDING: 65 ROOM: 110

POINT OF CONTACT:
WRDC/FIBE
WPAFB, OH 45433-6553
(513) 255-5956
AV 785-5056



Fatigue and Fracture Laboratory

FACILITY TYPE:
Acoustic Test Chamber

PURPOSE:
Study high level acoustic effects on structures

FACILITY NAME:
Large Acoustic Test Facility

PRIMARY CAPABILITIES:
Sonic fatigue testing of aircraft/spacecraft panels

High intensity acoustic testing

SPECIAL/UNIQUE CAPABILITIES:
70 ft long x 56 ft wide test chamber;10 ft diameter horn

Progressive wave ducts (up to 26 ft long duct; up to 167dB in 50 inch duct)

4 x 1 ft progressive wave duct with sinusoidal or random noise (up to 3 x 3 ft flat test panels; up to 170 dB)

INSTRUMENTATION:
Up to 9 Wyle noise generators usable for either duct

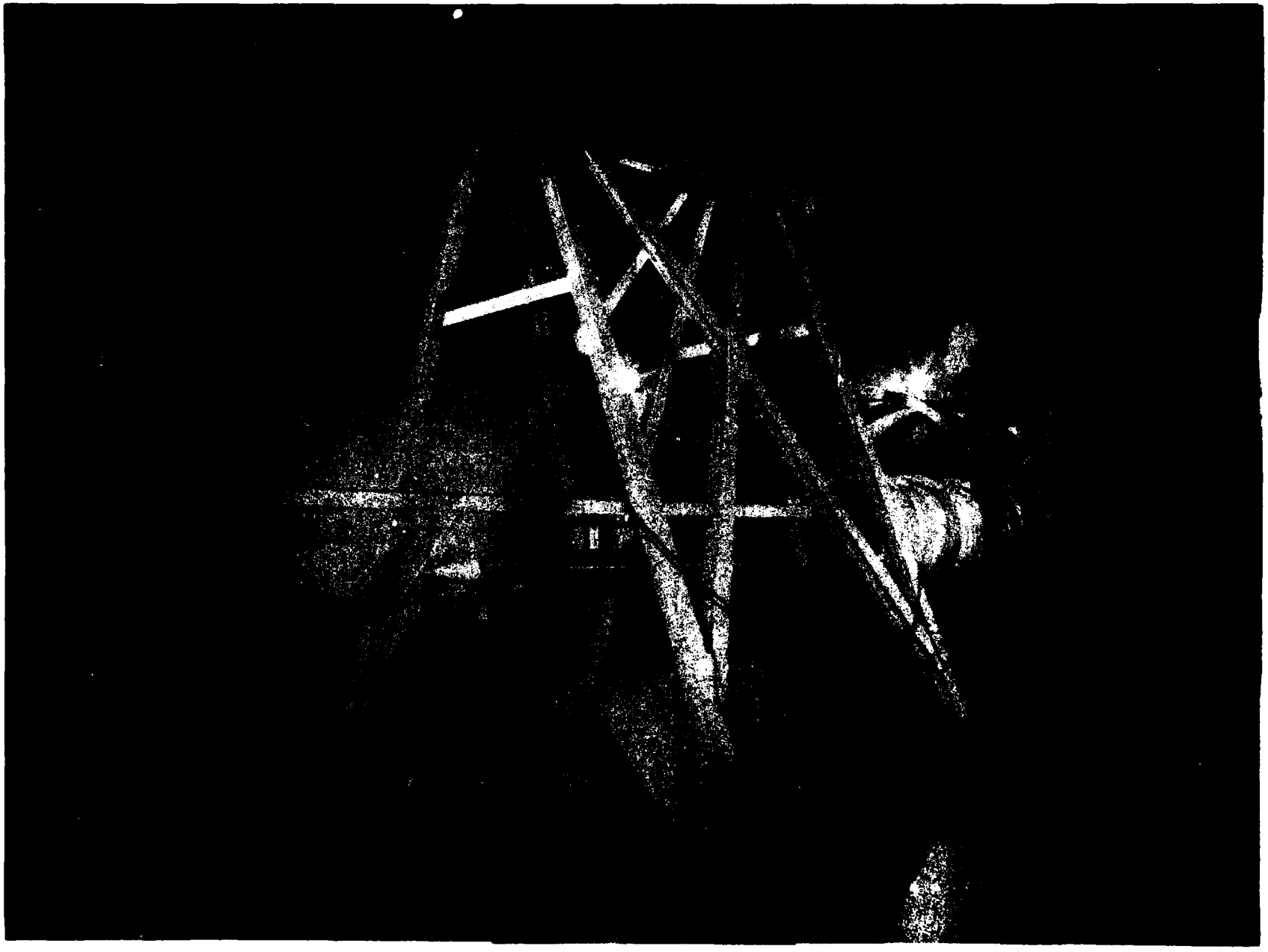
On-site data acquisition, recording and analysis

Up to 96 signal conditioning and recording channels

AVAILABILITY:
Available to U.S. Government agencies

LOCATION:
BUILDING: 461 ROOM:

POINT OF CONTACT:
WRDC//FIBG
WPAFB, OH 45433-6553
(513) 255-6622
AV 785-6622



Large Acoustic Test Facility

FACILITY TYPE:
Mobile Data Acquisition

PURPOSE:
Mobile data acquisition

FACILITY NAME:
Mobile Data Acquisition

PRIMARY CAPABILITIES:
Offsite data acquisition, recording, and analysis

SPECIAL/UNIQUE CAPABILITIES:
3 to 4 day independent operation

L-band telemetry data receiving; remote control video; optional central data reduction

36 channel recording/replay in Van #2

INSTRUMENTATION:
Van #1: Signal amplifiers, oscilloscopes, oscillographs, voltmeters, time code generator, pulse code commutation/decommutation; spectrum analyzers

Van #2: Honeywell 101 data recorder, Masscomp MC-500 computer with acquisition digitizer, laser and ink-jet printers,lo-pass filters, pulse code modulation

AVAILABILITY:
Available to U.S. Government agencies

LOCATION:
BUILDING: ROOM:

POINT OF CONTACT:
WRDC/FIBG
WPAFB, OH 45433-6553
(513) 255-6622
AV 785-6622

Mobile Data Acquisition

FACILITY TYPE:
Photomechanics

PURPOSE:
Provide precision measurement of motion

FACILITY NAME:
Photomechanics Facility

PRIMARY CAPABILITIES:
Laser/optical-based motion measurement and analysis

SPECIAL/UNIQUE CAPABILITIES:
Displacement measurement from less than a millionth of an inch to several feet

Non-contacting motion measurement from distances greater than 50 feet

Bandwidth up to 10,000 Hz; modal response measurement up to 2,000 degF.

INSTRUMENTATION:
Motion analysis processor, laser vibrometers

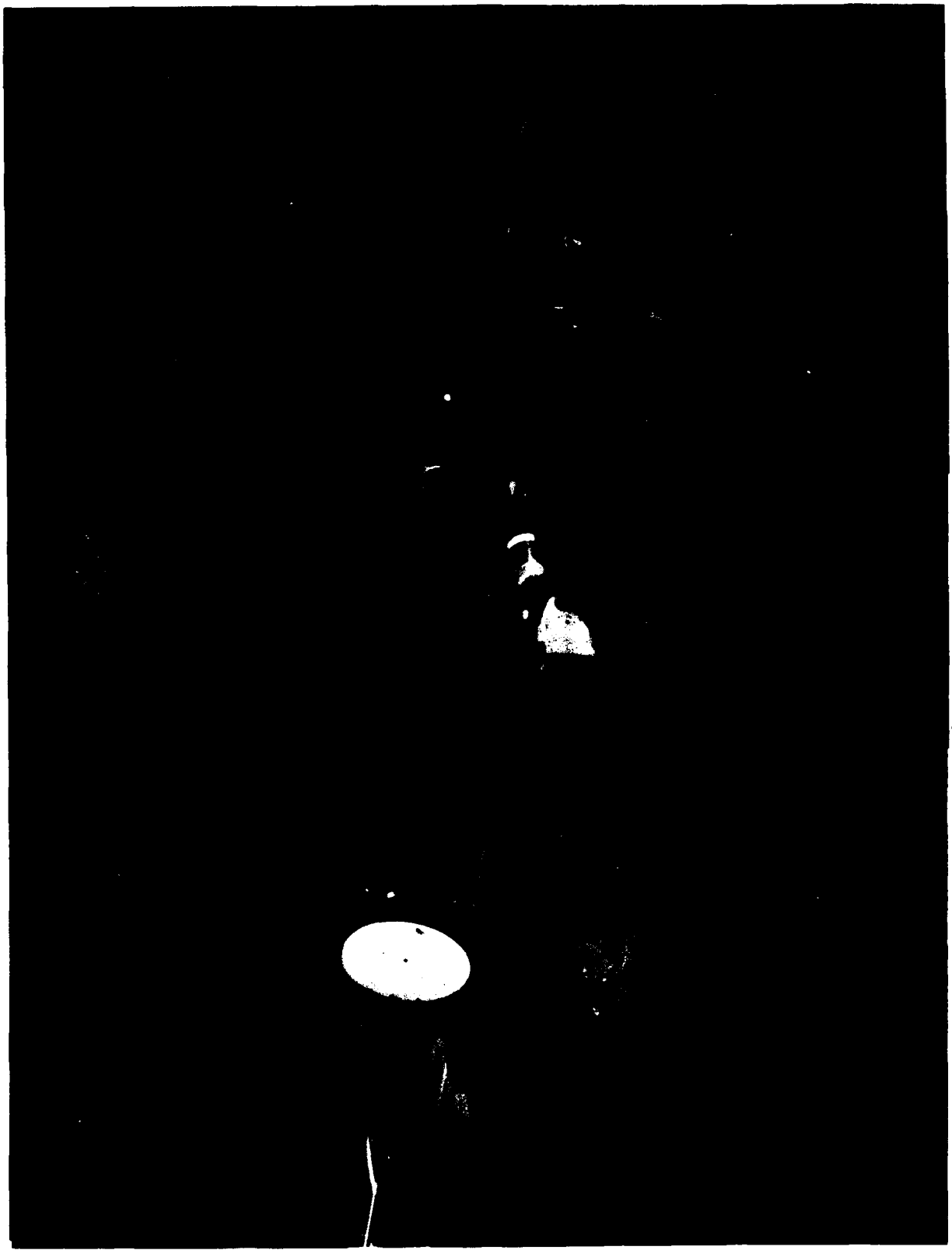
Lateral effect diode measurement system

Video holography system; Shadow Moire System

AVAILABILITY:
Available to U.S. Government agencies

LOCATION:
BUILDING: 45 ROOM:

POINT OF CONTACT:
WRDC/FIBG
WPAFB, OH 45433-6553
(513) 255-6622
AV 785-6622



Photomechanics Facility

FACILITY TYPE:
Acoustic Test Chamber

PURPOSE:
Study acoustic effects on structure

FACILITY NAME:
Quarter Scale Acoustic Test Chamber

PRIMARY CAPABILITIES:
Sonic fatigue testing of aircraft/spacecraft panels

High intensity acoustic testing

SPECIAL/UNIQUE CAPABILITIES:
Up to 167 dB SPL; bandwidth from 50 to 500 Hertz

Test panels up to 6 ft by 10 ft

Central data collection

INSTRUMENTATION:
Three Wyle noise generators.

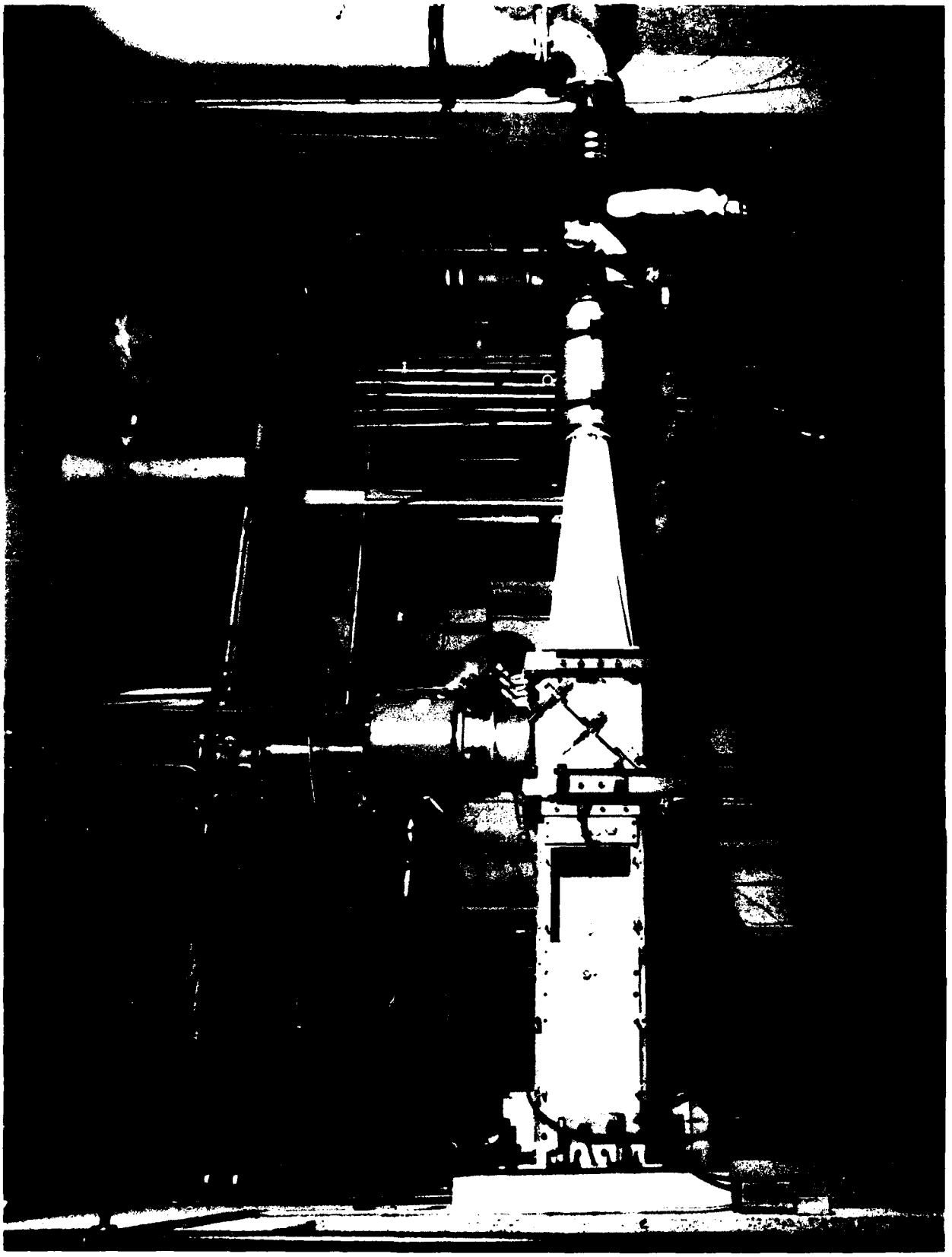
On-site data acquistion, recording and analysis

Up to 96 signal conditioning and recording channels

AVAILABILITY:
Available to U.S. Government agencies

LOCATION:
BUILDING: 24C ROOM:

POINT OF CONTACT:
WRDC/FIBG
WPAFB, OH 45433-6553
(513) 255-6622
AV 785-6622



Quarter Scale Acoustic Test Chamber

FACILITY TYPE:
Acoustic Test Chamber

PURPOSE:
Study acoustic effects on structure

FACILITY NAME:
Small Acoustic Test Chamber

PRIMARY CAPABILITIES:
Sonic fatigue testing of aircraft/spacecraft panels

Reliability testing of aircraft equipment

SPECIAL/UNIQUE CAPABILITIES:
174 dB maximum sound pressure level

Combined environment testing possible with temperatures up to 2,000 degF

Bandwidth from 50 to 500 Hz; central data collection

INSTRUMENTATION:
Two Wyle noise generators

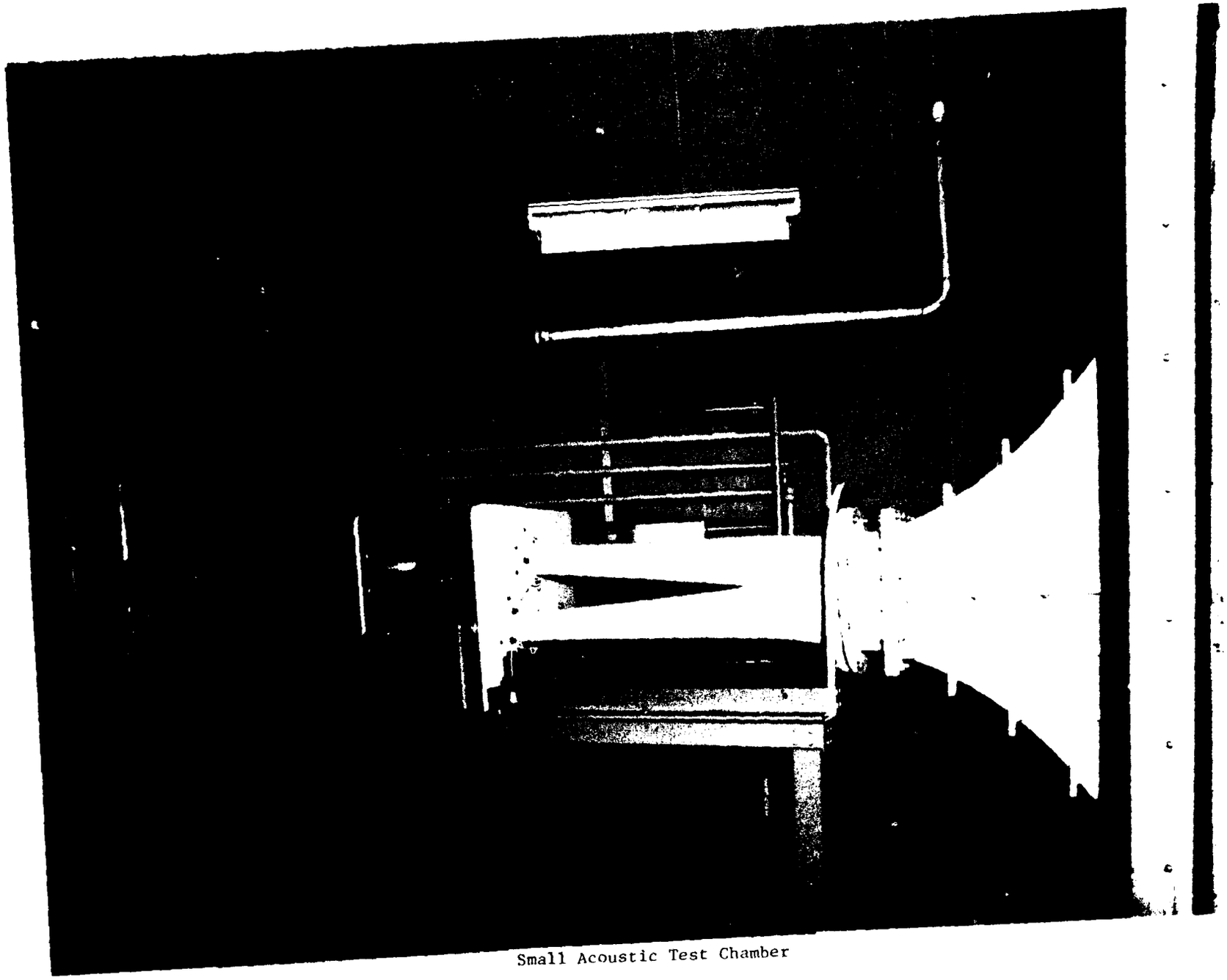
2,500 degF test article heater, temperature measuring equipment

On-site data acquisition, recording and analysis, up to 96 signal conditioning and recording channels

AVAILABILITY:
Available to U.S. Government agencies

LOCATION:
BUILDING: 24C ROOM:

POINT OF CONTACT:
WRDC/FIBG
WPAFB, OH 45433-6553
(513) 255-6622
AV 785-6622



Small Acoustic Test Chamber

FACILITY TYPE:
Vibration Test

PURPOSE:
Study effects of vibration on large aerospace structures

FACILITY NAME:
Vibration Test Facility

PRIMARY CAPABILITIES:
Vibration tests of aircraft/spacecraft systems

Active/passive vibration control studies

SPECIAL/UNIQUE CAPABILITIES:
Open and closed loop vibration control; 10 to 12,000 pound force excitation

30 ft long, 30 ft wide, 40 ft high acoustic and temperature controlled environment

Zero-gravity suspension available; optional central data reduction

INSTRUMENTATION:
96 channel PCM data recording system; 4 channel Gen Rad model test system; 4 channel Hewlett Packard model test system

10 to 12,000 pound force shakers; two real-time digital control computers

Accelerometers, strain gauges, optical and mechanical displacement transducers

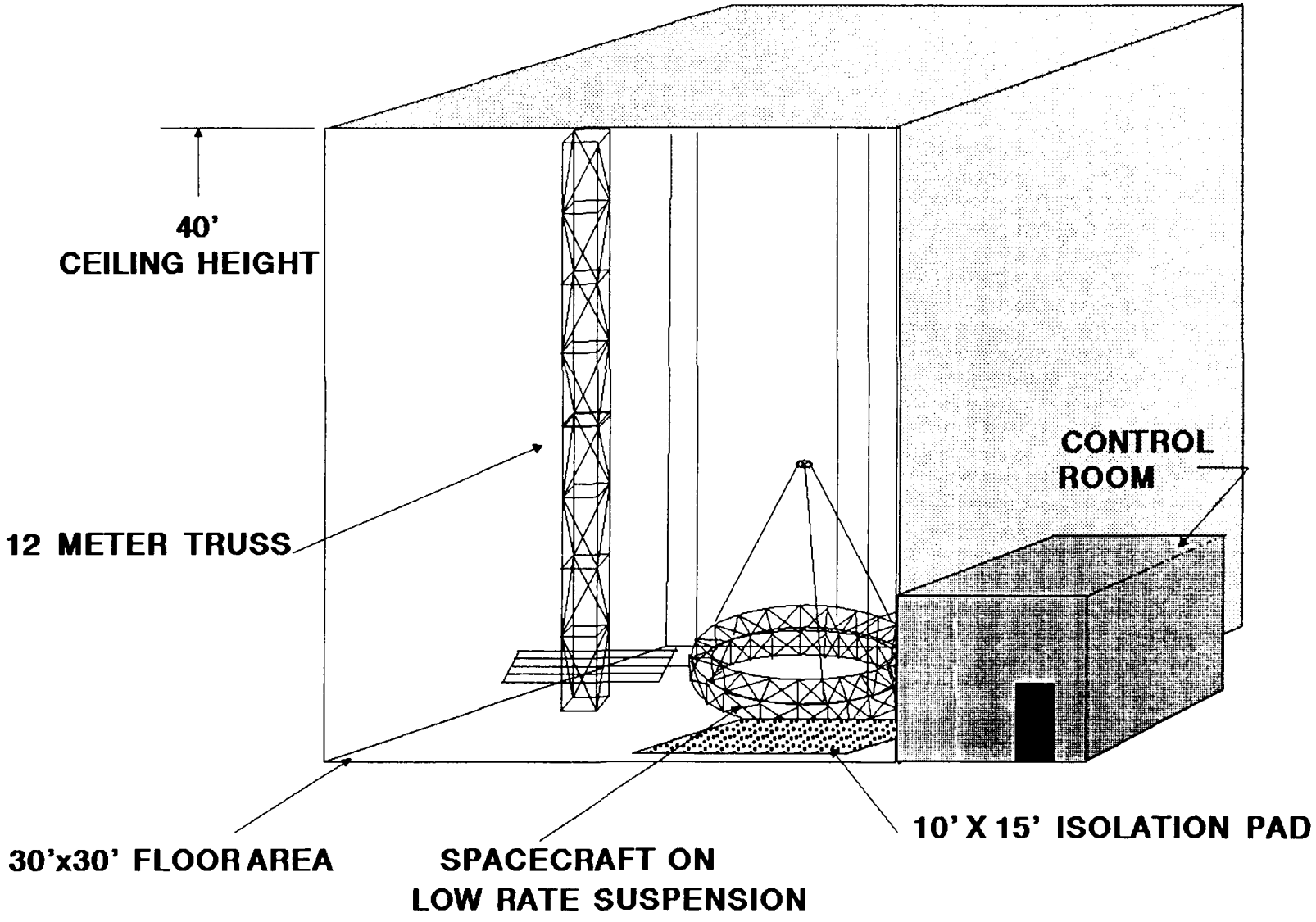
AVAILABILITY:
Available to U.S. Government agencies

Available to industry

LOCATION:
BUILDING: 24C ROOM:

POINT OF CONTACT:
WRDC/FIBG
WPAFB, OH 45433-6553
(513) 255-6622
AV 785-6622

VIBRATION TEST FACILITY



FACILITY TYPE:
Transparency Durability

PURPOSE:
Assess aircraft transparency durability and predict service life

FACILITY NAME:
Convection Heat Test Facility

PRIMARY CAPABILITIES:
Transparencies mounted on actual aircraft sections and installed in accordance with the technical orders

Each aircraft temperature/pressure profile modeled into various missions representative of its real life useage

Outer surface temperature ranges from -100 to +1000 degF

SPECIAL/UNIQUE CAPABILITIES:
Test section space large enough to accommodate large aircraft cockpits (up to B-1B cockpit)

Cockpit interior air conditioned and maintained at 75 degF

Cockpit interior pressurized

INSTRUMENTATION:
Video cameras, computer controlled, thermocouples

2000 channel data system

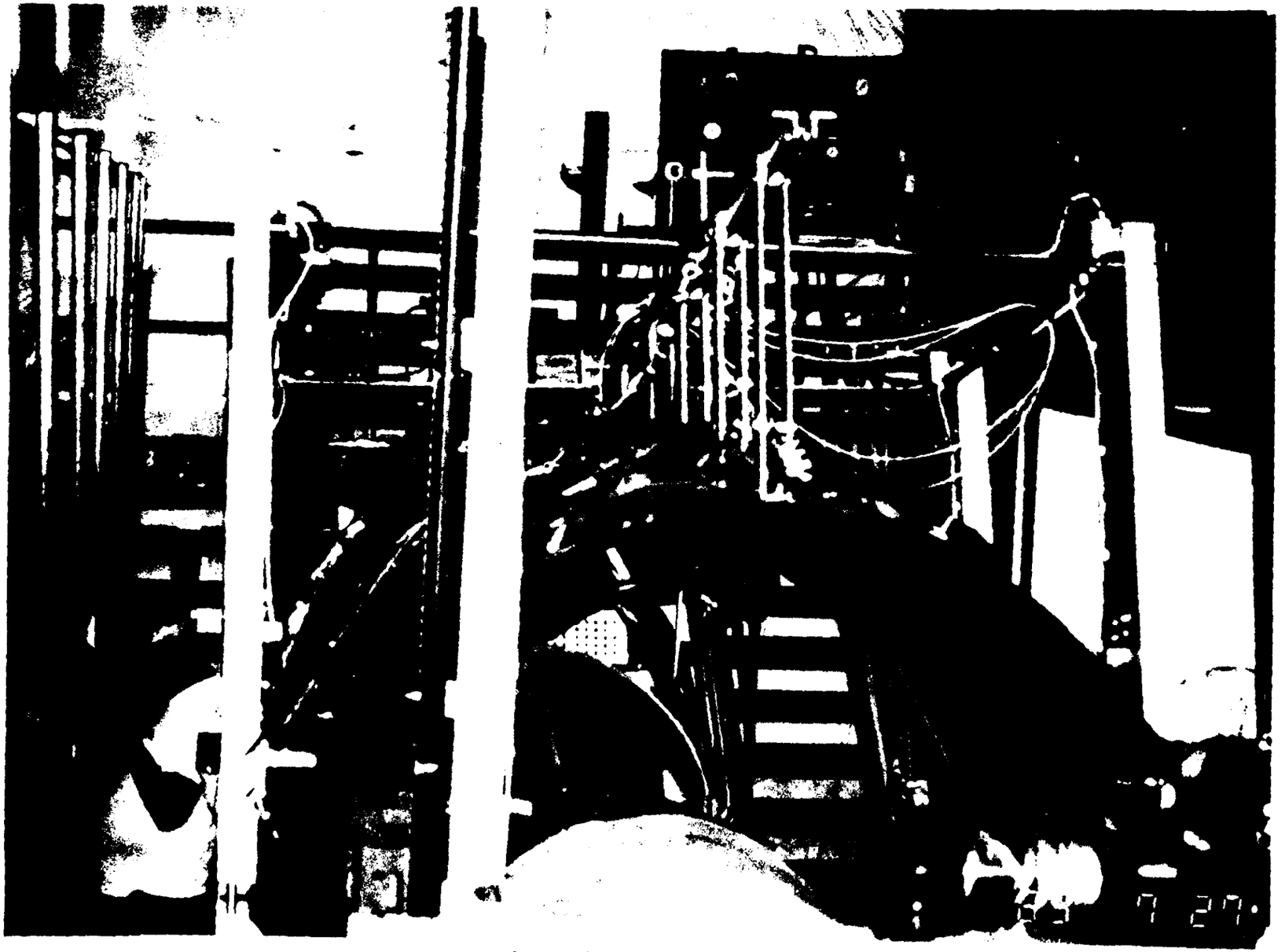
Temperature, strain and flux measurements

AVAILABILITY:
Primarily in-house research

Available to U.S. Government agencies and limited industrial use

LOCATION:
BUILDING: 68 ROOM:

POINT OF CONTACT:
WRDC/FIBT
WPAFB, OH 45433-6553
(513) 255-5059
AV 785-5059



Convection Heat Test Facility

FACILITY TYPE:
Aircraft Structures

PURPOSE:
Simulate high temperature structural effects

FACILITY NAME:
Elevated Temperature Testing Facility

PRIMARY CAPABILITIES:
Hot structures testing(leading edges, cowlings, etc.) up to 4200 deg F

Coupon level to full scale structures testing

Cryogenic testing down to -410 degF

SPECIAL/UNIQUE CAPABILITIES:
Quartz Lamps

Graphite Heaters; Vortec Arc Lamps

Combinations of above

INSTRUMENTATION:
Extensive monitoring and processing of test parameter data

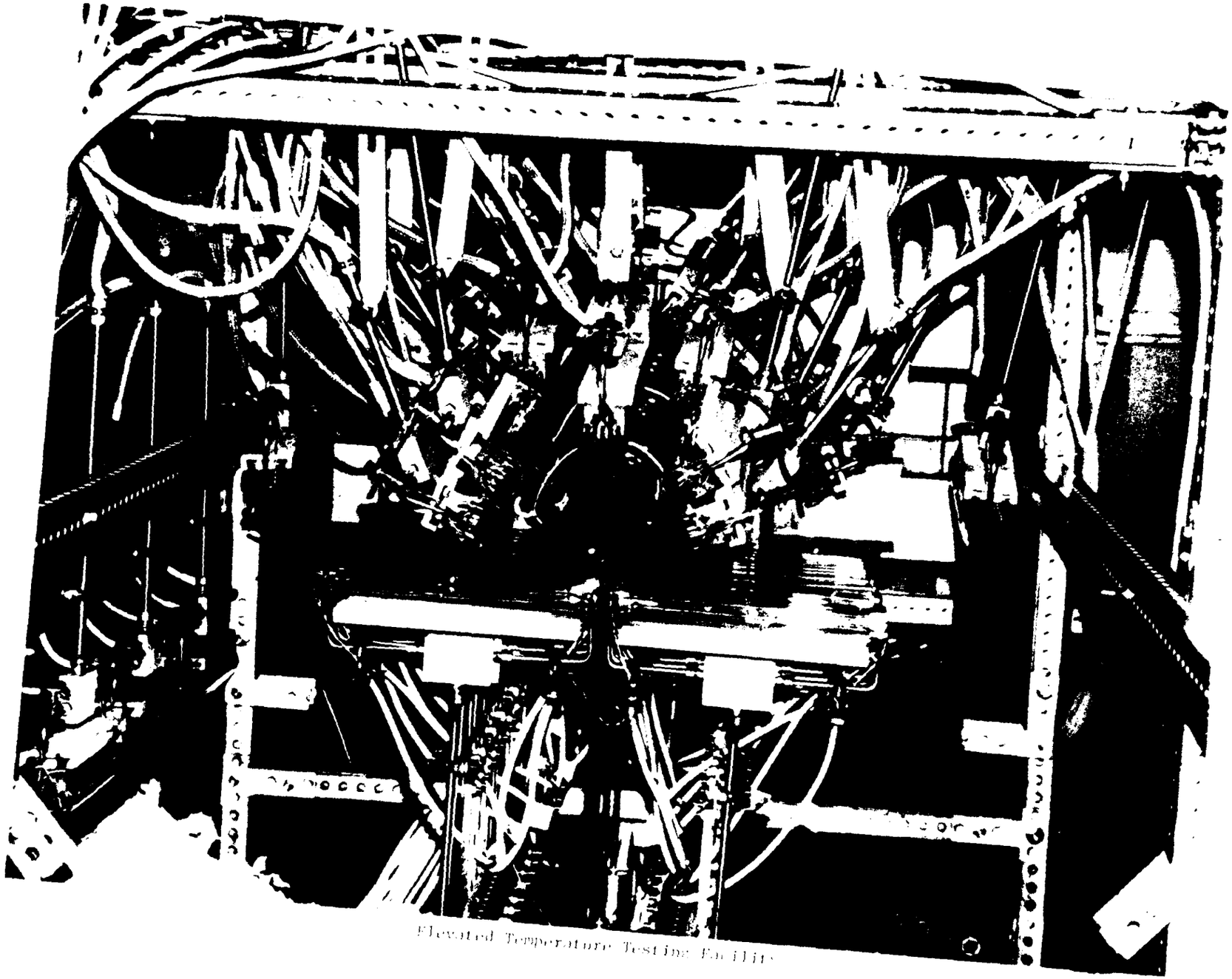
2000 channel data system

AVAILABILITY:
Available to U.S. Government agencies

Limited industrial use

LOCATION:
BUILDING: 65 ROOM:

POINT OF CONTACT:
WRDC/FIBT
WPAFB, OH 45433-6553
(513) 255-5059
AV 785-5059



Elevated Temperature Testing Facility

FACILITY TYPE:
Structures Research and Development

PURPOSE:
Conduct small scale structural component tests with cryogenic fuel simulation for purposes of structural analysis verification

FACILITY NAME:
Mini-Liquid Hydrogen Test Facility

PRIMARY CAPABILITIES:
Test table-top size components to true flight profile thermal and mechanical loads

Use liquid or gaseous hydrogen, helium or nitrogen for thermal stress simulation during tests in above profiles

Located in salvage yard area of building 65

SPECIAL/UNIQUE CAPABILITIES:
Ability to handle liquid hydrogen safely during high temperature structural tests

INSTRUMENTATION:
Same instrumentation as main structures test facility

AVAILABILITY:
Primarily in-house research

Available to government contractors

LOCATION:
BUILDING: 65 ROOM:

POINT OF CONTACT:
WRDC/FIBT
WPAFB, OH 45433-6553
(513) 255-5059
AV 785-5059

Mini-Liquid Hydrogen Test Facility

FACILITY TYPE:
Aircraft Structures

PURPOSE:
Structural testing of advanced design concepts

FACILITY NAME:
Room Temperature, Full-Scale Static and Fatigue Structure Testing

PRIMARY CAPABILITIES:
Existing weapon systems

R/D Structures

From component(s) to full size vehicle

New material concepts; multiple testing capabilities

SPECIAL/UNIQUE CAPABILITIES:
Baseline data comparisons (real time)

Development of newer, improved testing techniques

Classified capabilities

INSTRUMENTATION:
Large, dedicated computer system available

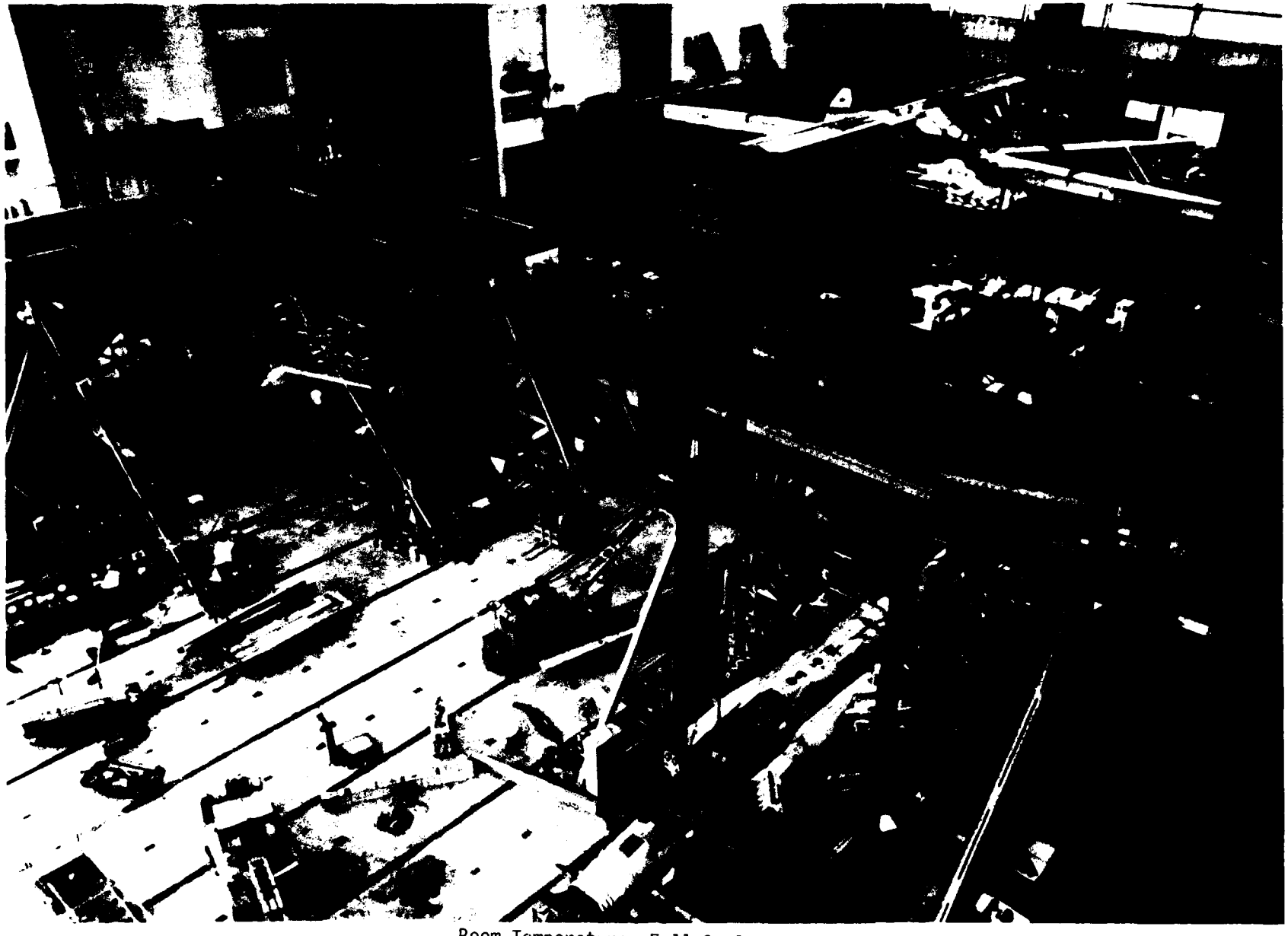
Extensive monitoring and processing of test parameters

AVAILABILITY:
Available to U.S. Government agencies

Limited industrial use

LOCATION:
BUILDING: 65 ROOM:

POINT OF CONTACT:
WRDC/FIBT
WPAFB, OH 45433-6553
(513) 255-5059
AV 785-5059



Room Temperature, Full-Scale Static and
Fatigue Structure Testing

FACILITY TYPE:
Piloted Engineering Flight Simulation

PURPOSE:
Develop flight control technology and assess flying qualities; integ rate advanced multidisciplinary technology

FACILITY NAME:
Control Integration and Assessment Laboratory

PRIMARY CAPABILITIES:
Piloted flight simulation with large amplitude motion and full visual capabilities

SPECIAL/UNIQUE CAPABILITIES:
Large Amplitude Motion Simulator (LAMARS) for assessing flight control technology and flying qualities

40 ft dome simulator with full field of view visual for mission environment simulations

Computer generated visual and sensor imagery

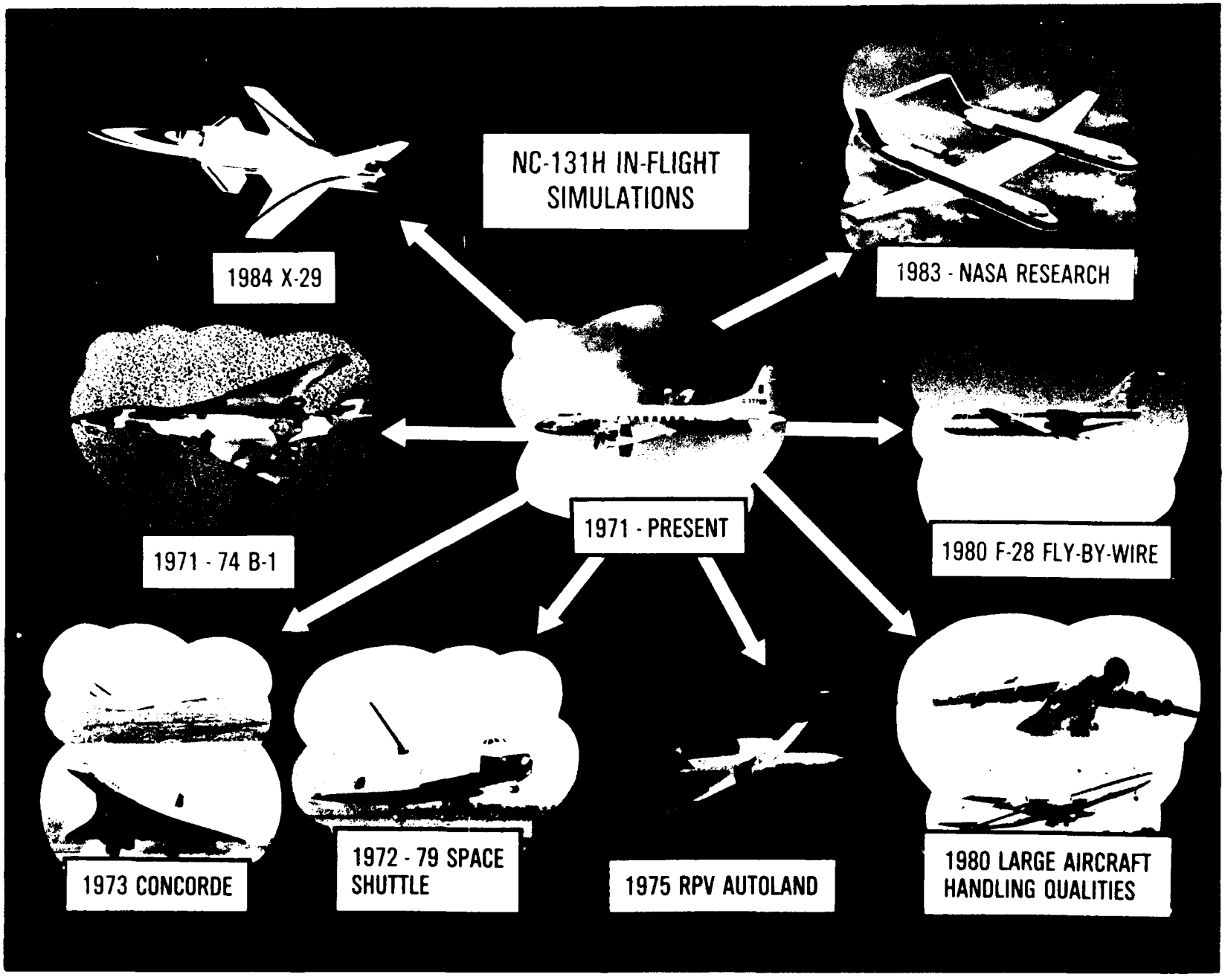
INSTRUMENTATION:
Full record and analysis of flight and mission parameters

AVAILABILITY:
Primarily in-house research

Limited outside use

LOCATION:
BUILDING: 145 ROOM: 117

POINT OF CONTACT:
WRDC/FIGD
WPAFB, OH 45433-6553
(513) 255-4690
AV 785-4690


NC-131H IN-FLIGHT SIMULATIONS
1984 X-29
1983 - NASA RESEARCH
1971 - 74 B-1
1971 - PRESENT
1980 F-28 FLY-BY-WIRE
1973 CONCORDE
1972 - 79 SPACE SHUTTLE
1975 RPV AUTOLAND
1980 LARGE AIRCRAFT HANDLING QUALITIES

FACILITY TYPE:
Lockheed NT-33A

PURPOSE:
Provide a research and development resource that allows airborne simulation to evaluate flying qualities and flight control characteristics of various aircraft

FACILITY NAME:
NT-33A In-Flight Simulator

PRIMARY CAPABILITIES:
Simulate the flight characteristics and properties of smaller aircraft and evaluate the handling qualities of different flight control systems

Aircraft housed at Calspan Flight Research Center, Buffalo NY when it is not deployed to an operating base

SPECIAL/UNIQUE CAPABILITIES:
Programmable HUD with display generator which allows the task of tracking a computer generated target to evaluate different quality flight control systems

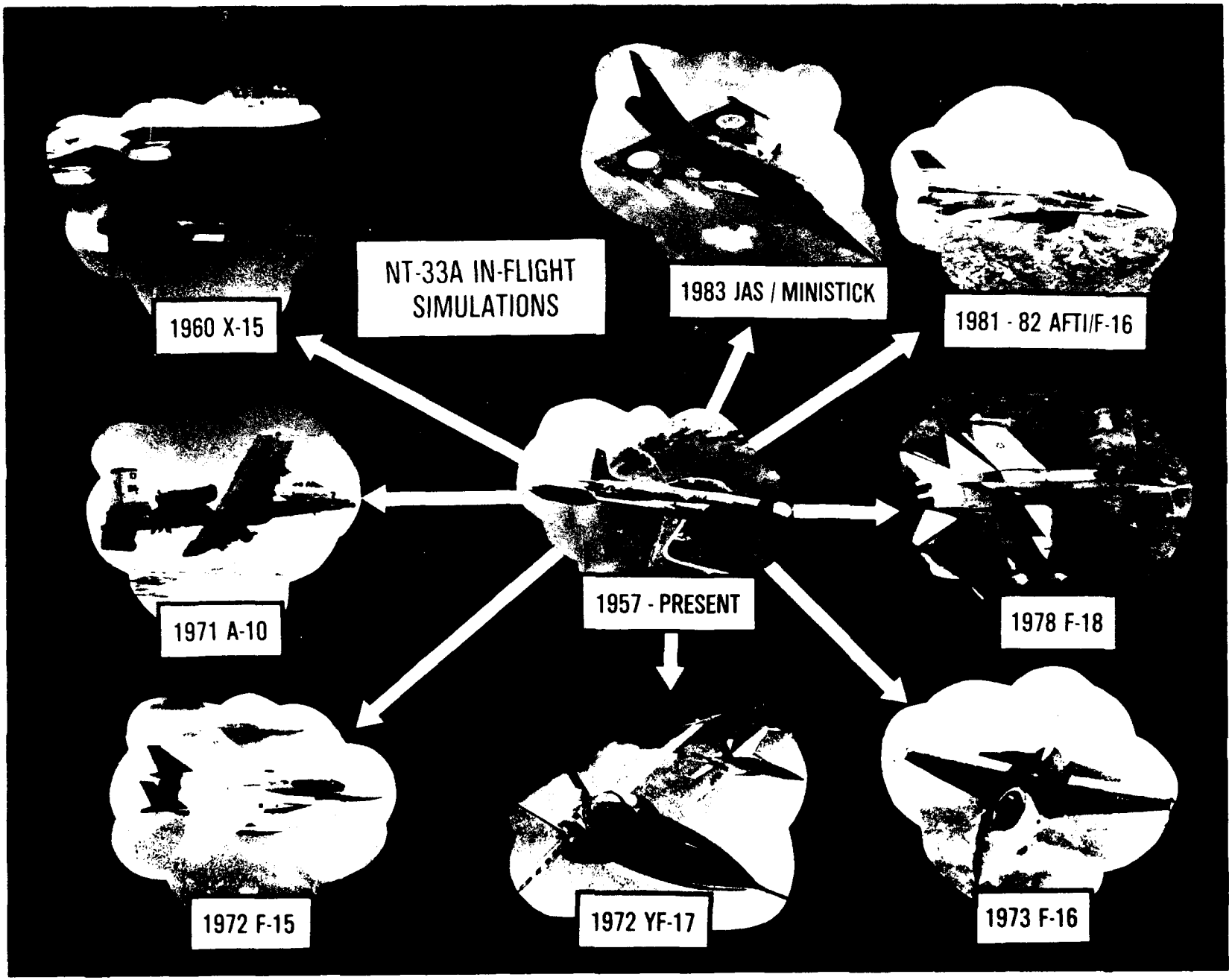
INSTRUMENTATION:
Normal instrumentation for T-33A including alpha and beta vanes; Rolm 1602 computer; accelerometers for all 6 degrees of freedom; data and video recorders

AVAILABILITY:
Available to Air Force and Navy Test Pilot Schools

Available for research work

LOCATION:
BUILDING: ROOM:

POINT OF CONTACT:
WRDC/FIGD
WPAFB, OH 45433-6553
(513) 255-3853
AV 785-3853


NT-33A IN-FLIGHT SIMULATIONS
1960 X-15
1983 JAS / MINISTICK
1981 - 82 AFTI/F-16
1971 A-10
1957 - PRESENT
1978 F-18
1972 F-15
1972 YF-17
1973 F-16

FACILITY TYPE:
Actuation Research and Development

PURPOSE:
Flight Control Actuator Research

FACILITY NAME:
Flight Control Actuation and Hydraulic Systems Facility

PRIMARY CAPABILITIES:
R&D of flight control actuators and subsystems

Test and evaluation of actuation devices

Evaluation of hydromechanical and electromechanical actuators

SPECIAL/UNIQUE CAPABILITIES:
General Purpose Actuator Test Rig: generate 85,000 lbs output force; evaluate linear actuation devices under simulated static and aerodynamic loading conditions

Flight Control Actuation Simulator: simulate flight control actuation systems; simulate static and aerodynamic load conditions on the simulated systems

Multi-Purpose Actuation System Test Rig: contains 36 loading actuators (18 top and 18 bottom) each capable of 3000 pounds of output force

INSTRUMENTATION:
Oscilloscopes, signal analyzers, pen and chart recorders, Hewlett-Packard Data Acquisition System

Environmental chamber (-100 degF to + 350 degF)

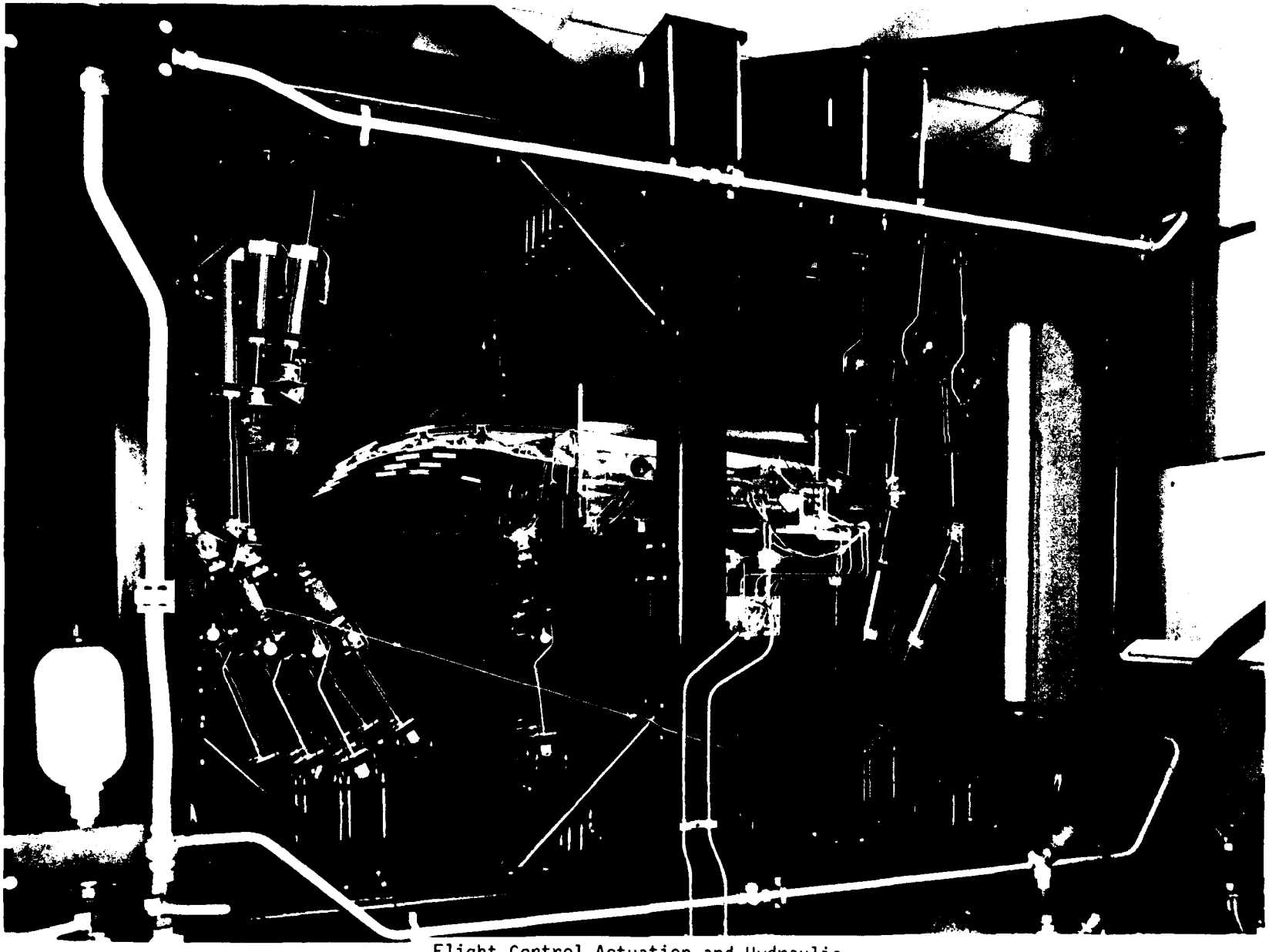
Hydraulic pumps, hydraulic test bench, pressure gages, miscellaneous equipment and power and hand tools

AVAILABILITY:
Primarily in-house research

Limited U.S. Government agency and industrial use

LOCATION:
BUILDING: 145 ROOM: 273

POINT OF CONTACT:
WRDC/FIGL
WPAFB, OH 45433-6553
(513) 255-2831
AV 785-2831



Flight Control Actuation and Hydraulic
Systems Facility

FACILITY TYPE:
Flight Control Simulation

PURPOSE:
Research and develop digital hardware and software systems for use in flight control

FACILITY NAME:
Computational Technologies Laboratory

PRIMARY CAPABILITIES:
Develop and test capabilities of digital hardware circuits, particularly those based on microprocessor technology

Produce laboratory demonstration brassboards and testbeds

Contains software development capabilities, programmable logic support, and limited CAD/CAE

SPECIAL/UNIQUE CAPABILITIES:
Utilize a multiuser software development system and several in-circuit microprocessor emulation systems

Construct wire-wrap circuitry and limited capability to construct printed circuit boards

INSTRUMENTATION:
In-circuit emulators (Tek 8560/40 systems), logic analyzers (Tek 1240, Das 9200)

Digital oscilloscope, data I/O logic programmer

Z-240s, IBM-AT

AVAILABILITY:
Primarily in-house research

Limited use by U.S. Government agencies and contractors

LOCATION:
BUILDING: 146 ROOM: 215

POINT OF CONTACT:
WRDC/FIGL
WPAFB, OH 45433-6553
(513) 255-8441
AV 785-8441

Computational Technologies Lab

FACILITY TYPE:
Unmanned Research Vehicle

PURPOSE:
Flight evaluation of flight control components/systems and selected aerodynamic concepts

FACILITY NAME:
Unmanned Research Vehicle (URV) Facility

PRIMARY CAPABILITIES:
Low risk/low cost testing of flight control components, sensors and electronic microprocessors for manned and unmanned flight vehicles

Payload bay accommodates one cubic foot package of 60 pounds

Computer model of URV test bed vehicle affords hardware-in-the-loop simulations prior to actual flight evaluations

SPECIAL/UNIQUE CAPABILITIES:
Conduct flight testing of unusual/unorthodox control concepts using on-board sensors to collect three axis acceleration information in real time

Facility proof-of-concept demonstrations using telemetry system and data collection/recording equipment in ground control station

Permit early feasibility determinations

INSTRUMENTATION:
On-board TV camera with downlink; three axis rate sensors; 28 volts 55 watts power available

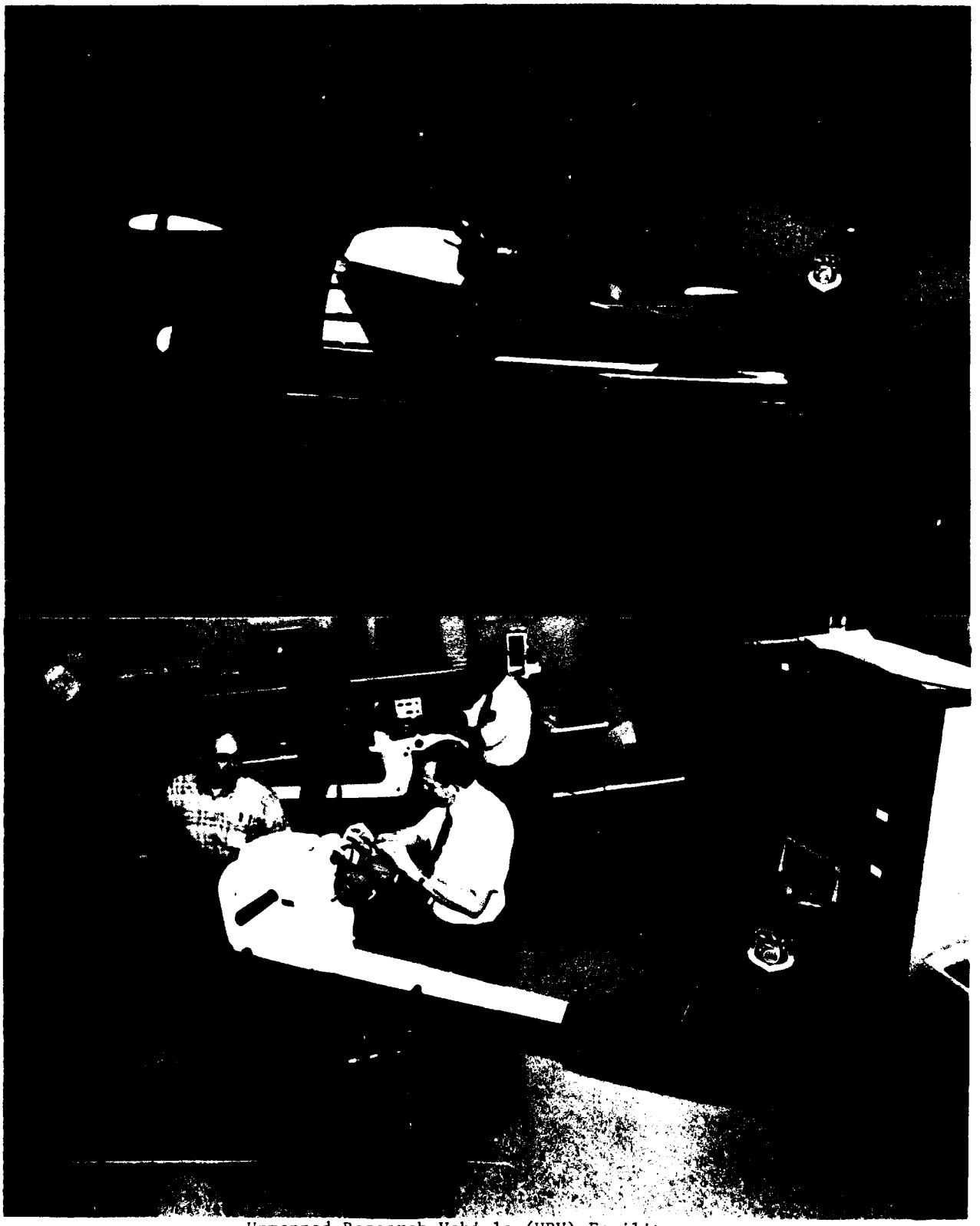
Alpha, beta vanes, airspeed sensor,altimeter and vertical velocity incorporated into the vehicle and input the digital autopilot

Telemetry system has 34 channels; data displayed/recorded in ground station

AVAILABILITY:
Primarily in-house use

LOCATION:
BUILDING: 146 ROOM:

POINT OF CONTACT:
WRDC/FIGL
WPAFB, OH 45433-6553
(513) 255-8285
AV 785-8285



Unmanned Research Vehicle (URV) Facility

FACILITY TYPE:
General Purpose Electronics Laboratory

PURPOSE:
Design/evaluate flight management concepts for large aircraft; evaluate systems and system modifications prior to installation in test aircraft

FACILITY NAME:
Control Systems Integration Laboratory

PRIMARY CAPABILITIES:
Bench checkout and analysis of airborne electronic equipment and related software; fabrication of brassboard equipment and development of software

Modify, maintain and repair flight management system hardware and software in support of Speckled Trout avionics upgrade program managed by ASD

SPECIAL/UNIQUE CAPABILITIES:
400 Hz portable power generator

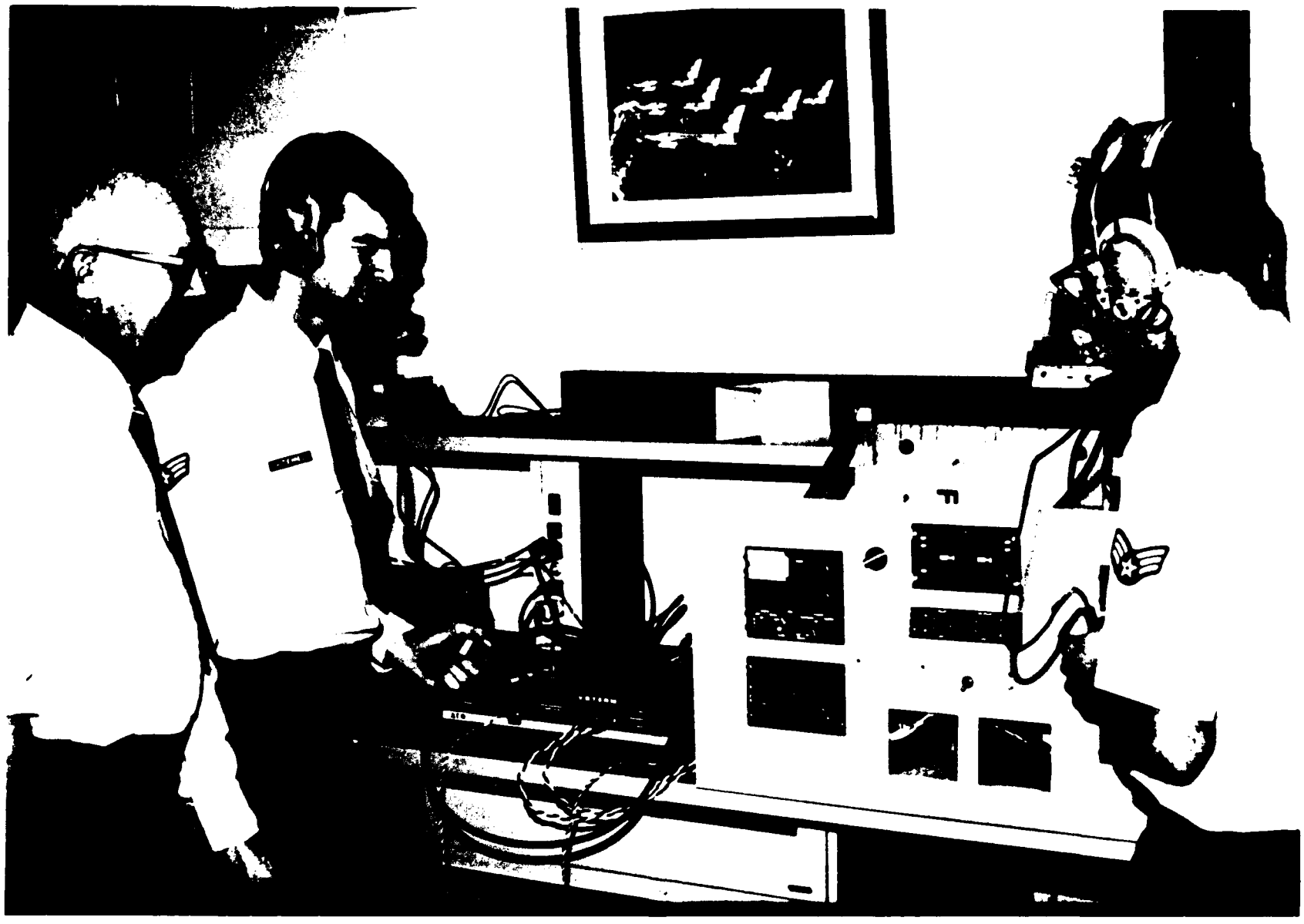
INSTRUMENTATION:
Oscilliscopes, personnal computers, electrical meters

AVAILABILITY:
Primarily in-house research

Available to US Government agencies and contractors

LOCATION:
BUILDING: 146 ROOM: 220

POINT OF CONTACT:
WRDC/FIGL
WPAFB, OH 45433-6553
(513) 255-4026
AV 785-4026



Control Systems Integration Laboratory

FACILITY TYPE:
Software prototyping and evaluation

PURPOSE:
Support development and application of artificial intelligence to flight control systems

FACILITY NAME:
Artificial Intelligence (AI) Laboratory

PRIMARY CAPABILITIES:
Symbolic computing equipment for prototyping expert systems, software development tools to facilitate expert system design, PC computing equipment

Provide a facility for hands-on training and experience in the development and evaluation of expert systems

Support in-house evaluation of expert systems developed by industry

SPECIAL/UNIQUE CAPABILITIES:
Large symbolic computers and associated software support tools

INSTRUMENTATION:
Computers:Compaq 286,Symbolics 3670, LMI Lambda, MacIntosh II

Software: GEMS, KEE/ART/LISP, LISP, LISP/PEARL respectively with computers listed above

Other: video disk recorder

AVAILABILITY:
Primarily in-house research

Available to US Government agencies and industry

LOCATION:
BUILDING: 146 ROOM: 220

POINT OF CONTACT:
WRDC/FIGL
WPAFB, OH 45433-6553
(513) 255-4026
AV 785-4026

Artificial Intelligence (AI) Laboratory

FACILITY TYPE:
Aircraft Simulation (NF-16D, Tail Number 86-048)

PURPOSE:
Conduct in-flight simulation

FACILITY NAME:
Variable Stability In-Flight Simulator Test Aircraft (VISTA)

PRIMARY CAPABILITIES:
Simulate the flying characteristics and cockpit environment of new or existing configurations

Provide test bed aircraft for flight control, pilot-vehicle interface and avionics/flight control integration research programs

SPECIAL/UNIQUE CAPABILITIES:
Response feedback variable stability system capable of five degrees-of-freedom simulation control

Two place cockpit; front seat evaluation cockpit, rear seat safety cockpit; safety monitoring system for reversion back to safety pilot and host F-16 systems

F-16 controls and displays with additional variable feel centerstick in evaluation cockpit

INSTRUMENTATION:
F-16D block 40 avionics

Hawk 32 computers with spare 1553 MUX bus capacity; volume and power available for customer hardware installation

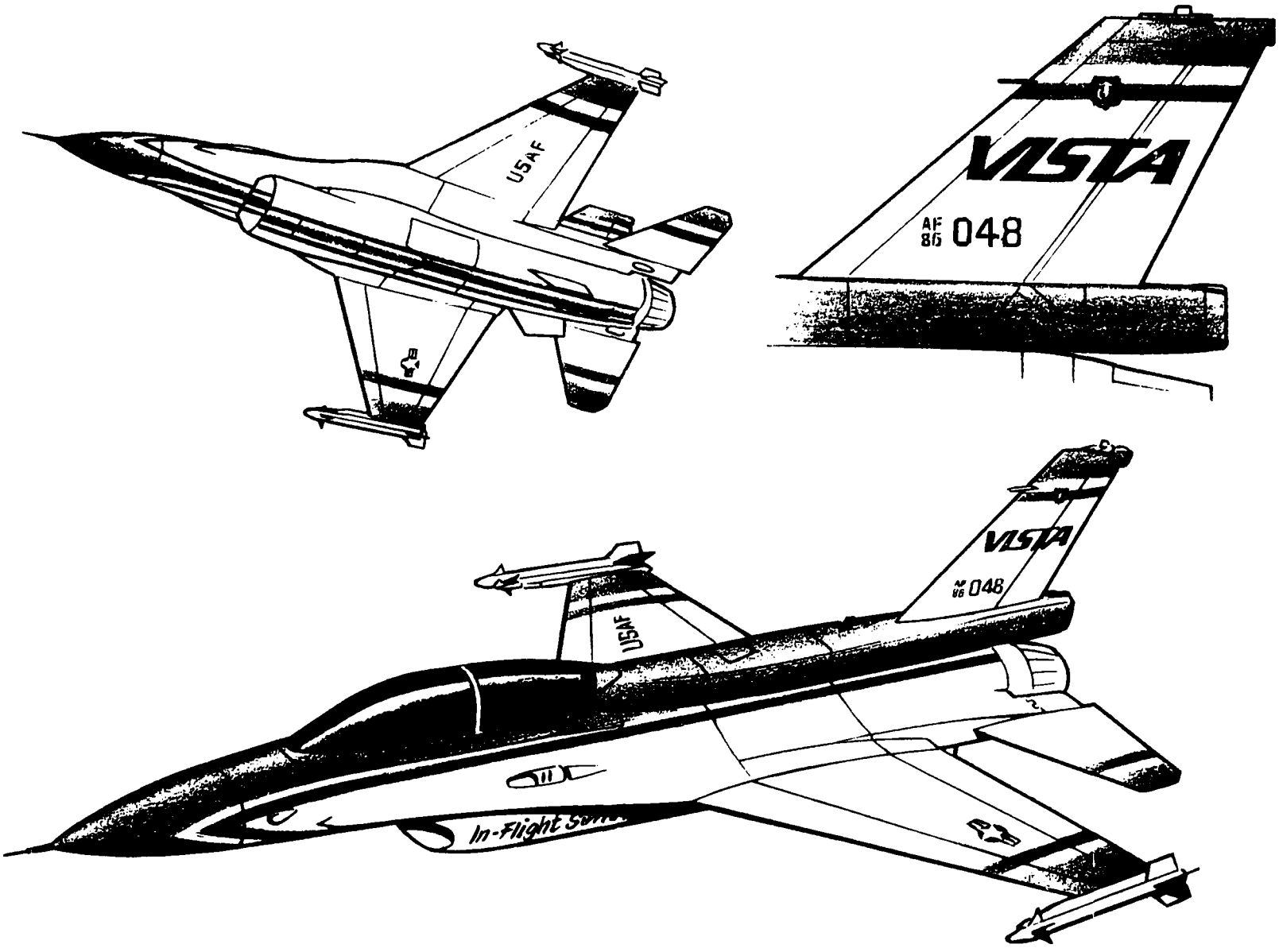
AFFTC Airborne Test Instrumentation System (ATIS); two video recorders

AVAILABILITY:
Available for both in-house and contract test programs

Aircraft available late fall 1991

LOCATION:
BUILDING: ROOM:

POINT OF CONTACT:
WRDC/FIGX
WPAFB, OH 45433-6553
(513) 255-8279
AV 785-8279


USAF
VISTA
AF 86 048
VISTA
USAF

FACILITY TYPE:
Wind tunnel

PURPOSE:
High Mach experiments

FACILITY NAME:
Mach 3, High Reynolds Number Facility

PRIMARY CAPABILITIES:
Uniform Mach 3 flow

Reynolds Number range to 140 million/foot

8 inch by 8 inch test section

SPECIAL/UNIQUE CAPABILITIES:
High Reynolds Number capability

Run times as long as 3 minutes possible

INSTRUMENTATION:
45 channel pressure measuring system; 30 channel thermocouple reference junction system

Flow field probing; flow field measuring capability

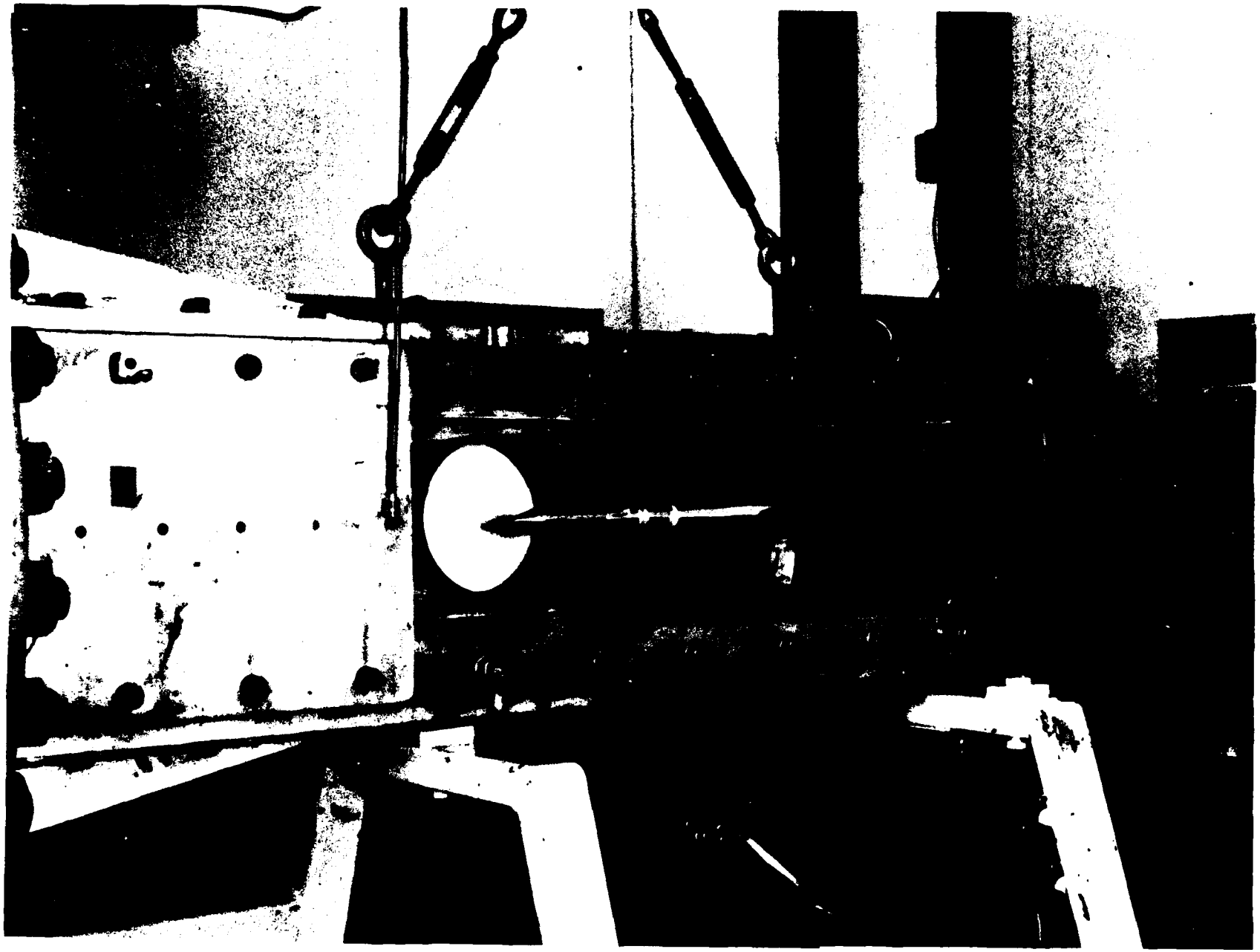
Hot-wire measuring capability; Schlieren and two component laser velocimeter available

AVAILABILITY:
Primarily in-house research

Limited U.S. Government agency use

LOCATION:
BUILDING: 456 ROOM:

POINT OF CONTACT:
WRDC/FIMG
WPAFB, OH 45433-6553
(513) 255-5806
AV 785-5806



Mach 3, High Reynolds Number Facility

FACILITY TYPE:
Wind Tunnel

PURPOSE:
High Mach experiments

FACILITY NAME:
Mach 6, High Reynolds Number Facility

PRIMARY CAPABILITIES:
12 inch diameter open jet test section

Uniform Mach 6 flow

Reynolds Number range to 30 million/foot

Simulate flight conditions from 30,000 ft to 130,000 ft

SPECIAL/UNIQUE CAPABILITIES:
Run duration to 4 minutes at low Reynolds Number condition

Run duration of 2 to 3 minutes per day at high Reynolds Number condition

Schlieren and two component laser velocimeter systems available

INSTRUMENTATION:
45 channel pressure measuring system, 30 channel thermocouple reference junction system

Three dimensional flow field probing; two ranges of 6 component force balances available

128 channel data acquisition system capable of sampling all channels up to 10 times/second

AVAILABILITY:
Primarily in-house research

Limited U.S. Government agency use

LOCATION:
BUILDING: 456 ROOM:

POINT OF CONTACT:
WRDC/FIMG
WPAFB, OH 45433-6553
(513) 255-5806
AV 785-5806

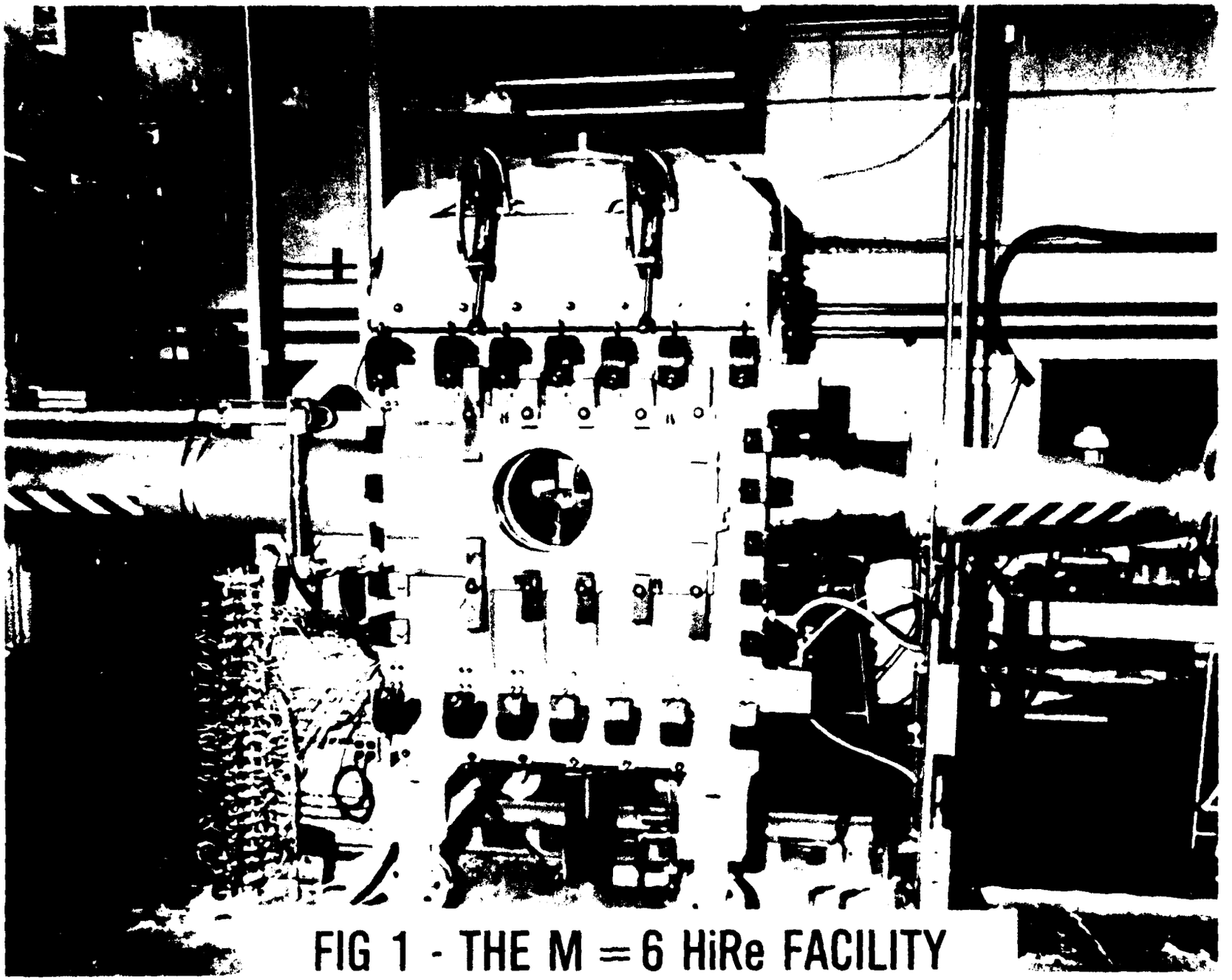


FIG 1 - THE M = 6 HiRe FACILITY

FACILITY TYPE:
Wind Tunnel

PURPOSE:
High Mach experiments

FACILITY NAME:
Twenty Inch Hypersonic Wind Tunnel

PRIMARY CAPABILITIES:
20 inch open jet test section

Uniform Mach 12 or Mach 14 flow

Reynolds Number range to 1 million/foot

Simulate flight conditions from 120,000 to 150,000 feet

SPECIAL/UNIQUE CAPABILITIES:
Run times from 5 to 8 minutes

INSTRUMENTATION:
45 channel pressure measuring system

30 channel thermocouple reference junction system

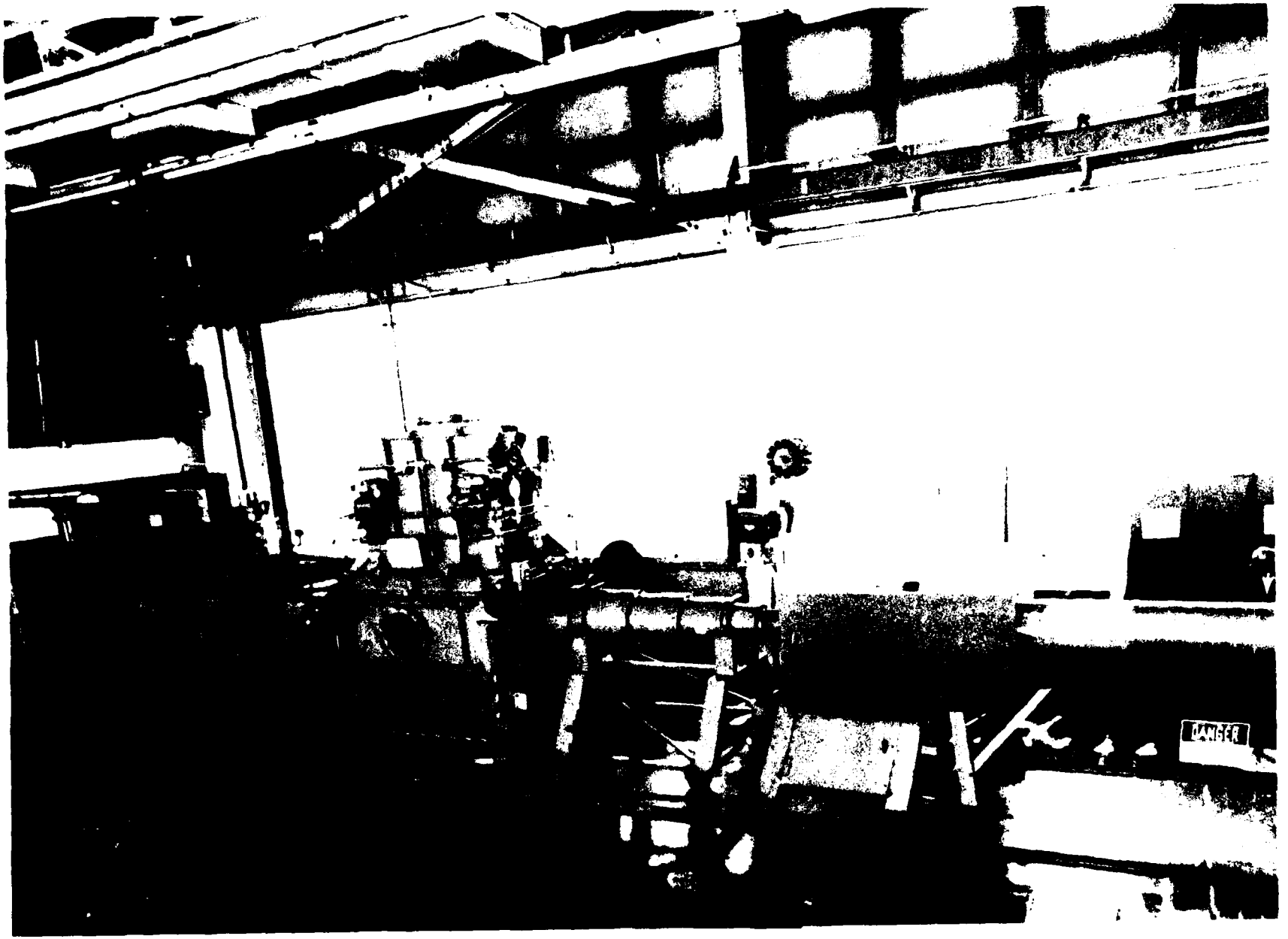
128 channel test data read-out capability

AVAILABILITY:
Primarily in-house research

Limited U.S. Government agency use

LOCATION:
BUILDING: 450 ROOM:

POINT OF CONTACT:
WRDC/FIMG
WPAFB, OH 45433-6553
(513) 255-5806
AV 785-5806



20 Inch Hypersonic Wind Tunnel

FACILITY TYPE:
Wind Tunnel

PURPOSE:
Closed circuit, continuous flow, variable density wind tunnel experiments

FACILITY NAME:
Trisonic Gasdynamics Facility

PRIMARY CAPABILITIES:
Mach range from 0.23 to 3.0

Reynolds Number range from 1 million/foot to 6 million/foot

Two foot square test section

Schlieren capability

SPECIAL/UNIQUE CAPABILITIES:
Multi-Mach Number capability

INSTRUMENTATION:
Pressure measuring capability, force measuring capability

Laser flow visualization, flow field probing capability

Fully automated data support

AVAILABILITY:
Primarily in-house research

Limited U.S. Government agency and Government contractors

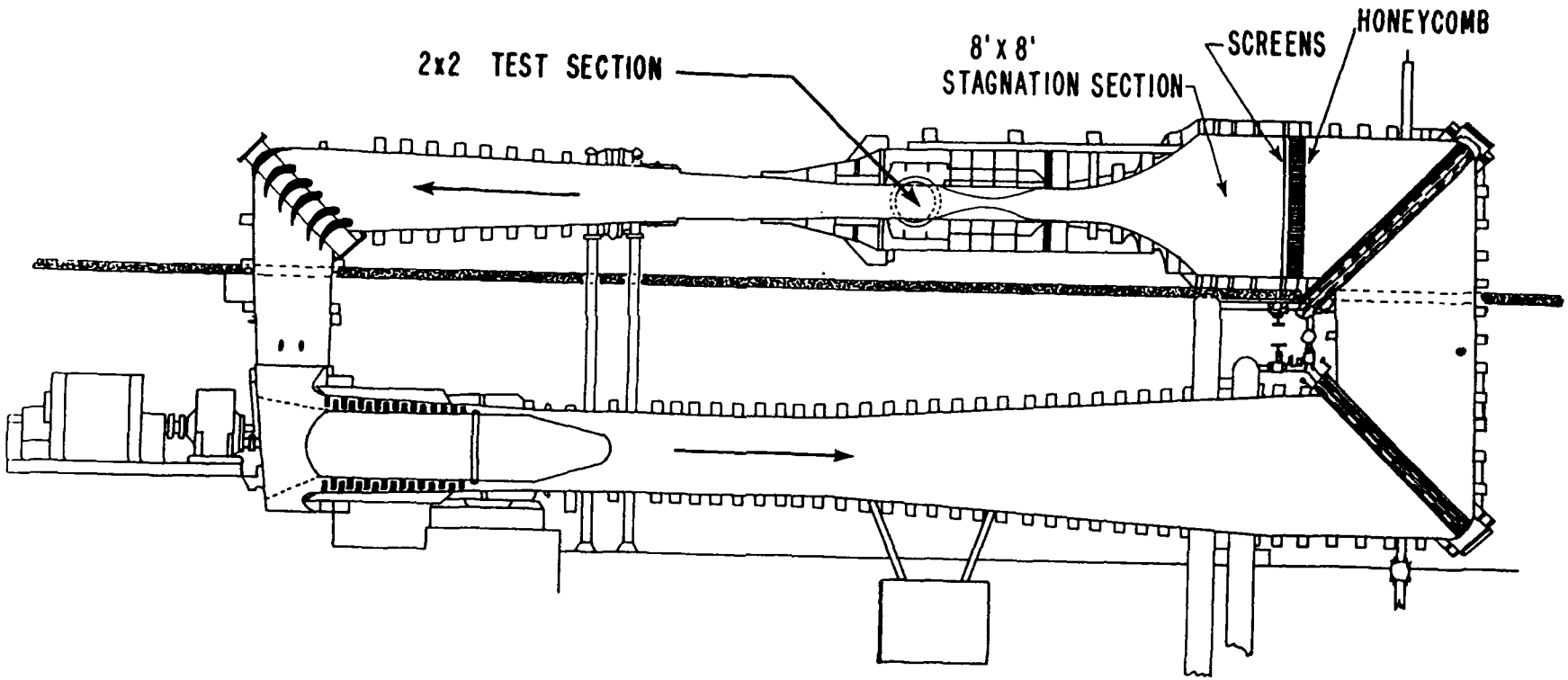
LOCATION:
BUILDING: 26 ROOM:

POINT OF CONTACT:
WRDC/FIMM
WPAFB, OH 45433-6553
(513) 255-4579
AV 785-4579

PERFORMANCE RANGE

P_o - 200 TO 4,000 PSF

M_N - .05 TO 3.0



Trisonic Gasdynamics Facility

FACILITY TYPE:
Wind Tunnel

PURPOSE:
Parachute and free-falling body experiments

FACILITY NAME:
Vertical Wind Tunnel

PRIMARY CAPABILITIES:
Mach range:0 to .12; Reynolds Number (x 10exp6/ft): 0 to .91; total pressure (psia): atmospheric; run time: continuous

12 foot diameter open jet test section; dynamic pressure (psf): 0 to 26; total temperature (degR): ambient

Atmospheric tunnel

SPECIAL/UNIQUE CAPABILITIES:
Free-fall training capability

Sub-munitions decelerator testing

Sting balance capable of 6-component measurements available

INSTRUMENTATION:
Pressure measuring capability

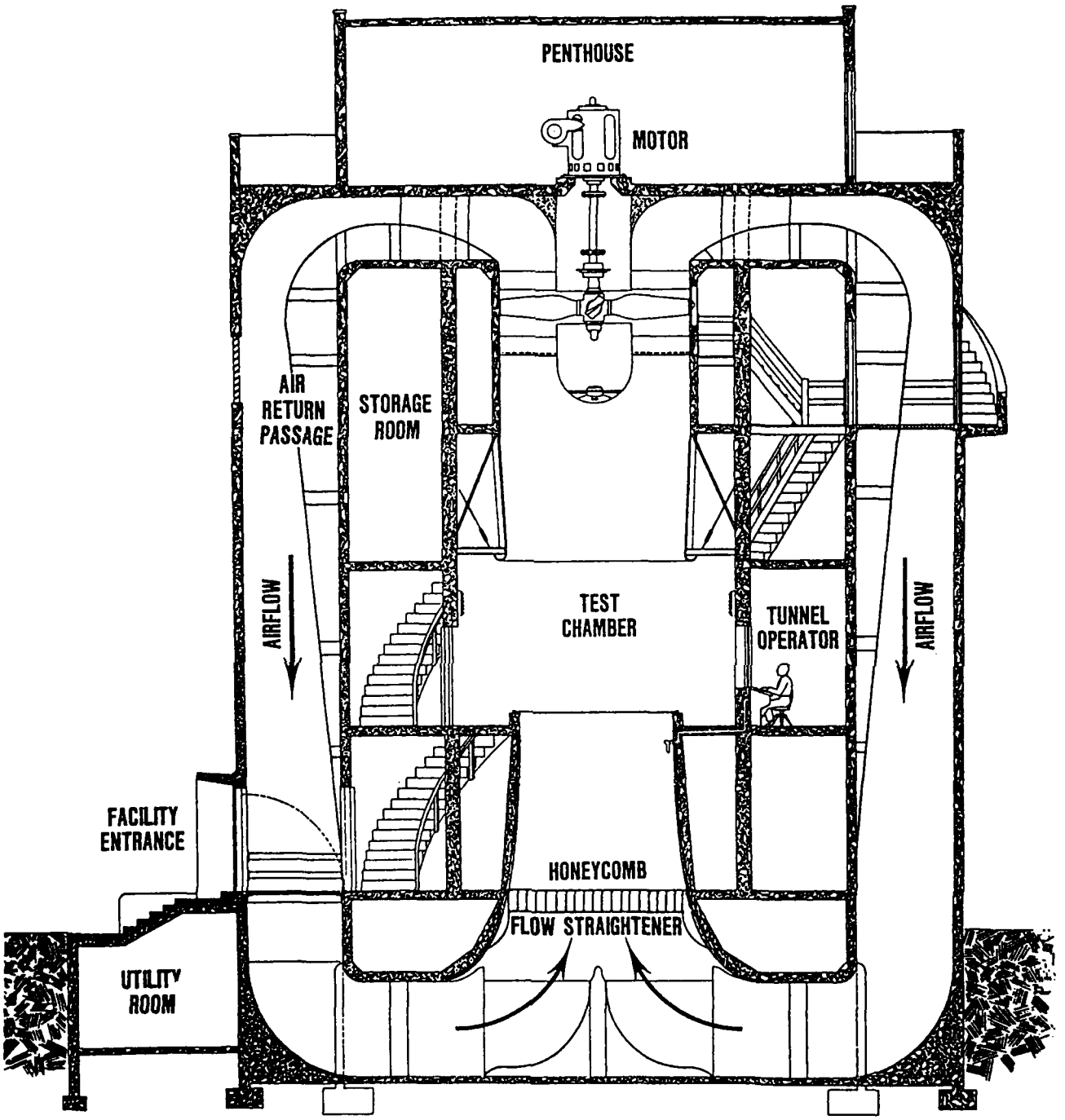
Force measuring capability; drag measuring capability

Motion picture and still photographic coverage available

AVAILABILITY:
Limited U.S. Government agency and Government contractor use

LOCATION:
BUILDING: 27 ROOM:

POINT OF CONTACT:
WRDC/FIMM
WPAFB, OH 45433-6553
(513) 255-4579
AV 785-4579



VERTICAL WIND TUNNEL

WRIGHT-PATTERSON AIR FORCE BASE

FACILITY TYPE:
Water Tunnel

PURPOSE:
Enhanced flow visualization experiments

FACILITY NAME:
Hydrodynamic Test Facility

PRIMARY CAPABILITIES:
2 foot by 2 foot test section

Velocity range: 0.10 to 0.85 ft/sec

Velocity range of .10 to .30 ft/sec provides optimum flow visualization when using dye-injection method

SPECIAL/UNIQUE CAPABILITIES:
Water medium enhances flow visualization

INSTRUMENTATION:
Laser Doppler velocitimeter

Laser-light sheet with forward looking photographic system

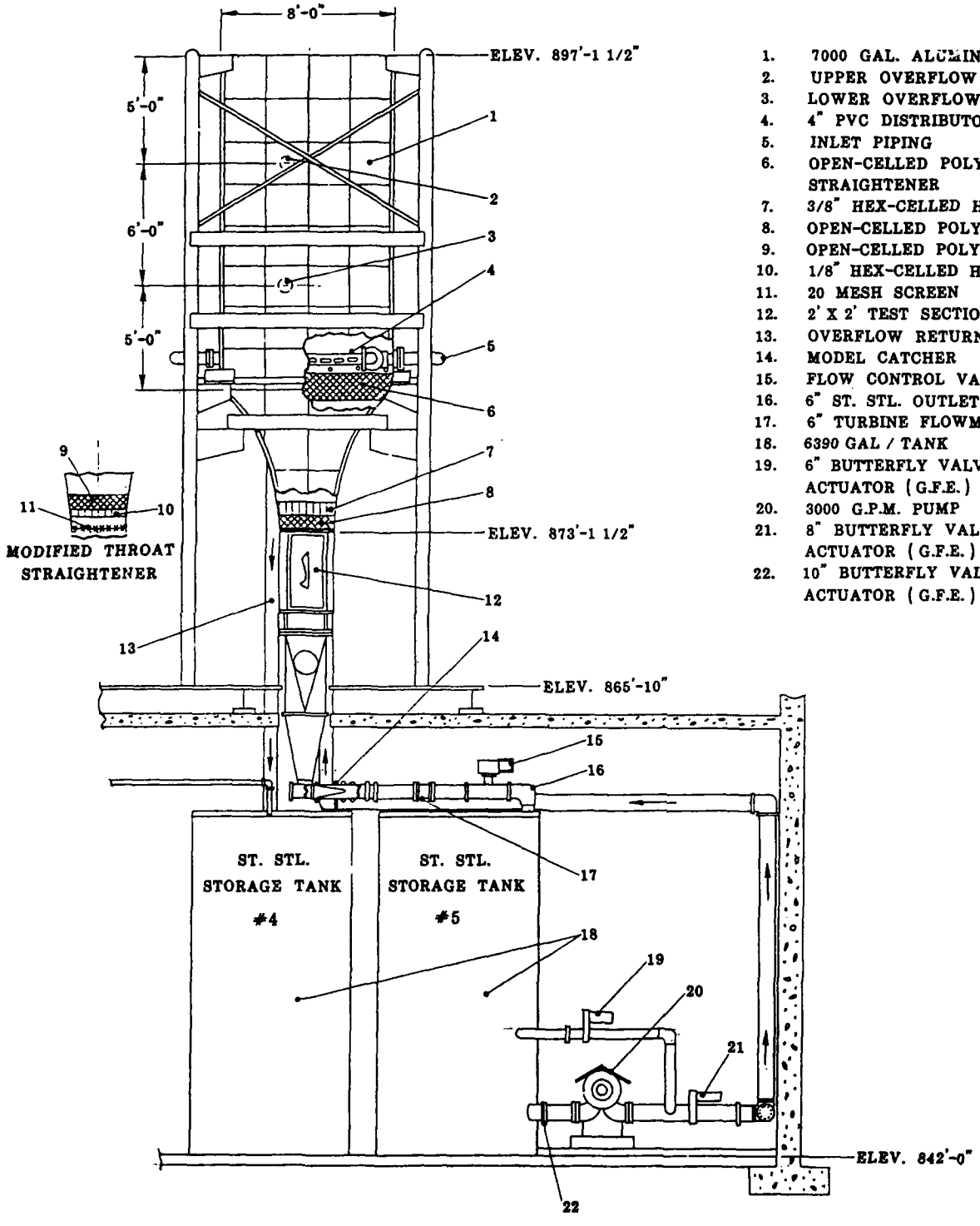
Multiple colored dye-injection capability

AVAILABILITY:
Primarily in-house research

Limited U.S. Government agencies and Government contractors

LOCATION:
BUILDING: 25A ROOM:

POINT OF CONTACT:
WRDC/FIMM
WPAFB, OH 45433-6553
(513) 255-3788
AV 785-3788



1. 7000 GAL. ALUMINUM RESERVOIR
2. UPPER OVERFLOW LEVEL
3. LOWER OVERFLOW LEVEL
4. 4" PVC DISTRIBUTOR
5. INLET PIPING
6. OPEN-CELLED POLY FOAM STRAIGHTENER
7. 3/8" HEX-CELLED HONEYCOMB
8. OPEN-CELLED POLY-FOAM
9. OPEN-CELLED POLY-FOAM
10. 1/8" HEX-CELLED HONEYCOMB
11. 20 MESH SCREEN
12. 2' X 2' TEST SECTION
13. OVERFLOW RETURN
14. MODEL CATCHER
15. FLOW CONTROL VALVE
16. 6" ST. STL. OUTLET PIPING
17. 6" TURBINE FLOWMETER
18. 6390 GAL / TANK
19. 6" BUTTERFLY VALVE & ACTUATOR (G.F.E.)
20. 3000 G.P.M. PUMP
21. 8" BUTTERFLY VALVE & ACTUATOR (G.F.E.)
22. 10" BUTTERFLY VALVE & ACTUATOR (G.F.E.)

Hydrodynamic Test Facility

FACILITY TYPE:
Wind Tunnel

PURPOSE:
Maximum subsonic flow visualization

FACILITY NAME:
Subsonic Aerodynamic Research Laboratory (SARL)

PRIMARY CAPABILITIES:
Mach range from 0.2 to 0.6

Atmospheric tunnel

10 ft by 7 ft test section

SPECIAL/UNIQUE CAPABILITIES:
High angle of attack testing capability; very low turbulence

Enhanced flow visualization (55% = optical plexiglass); very large force measuring capability

Capable of testing power-simulated vehicles

INSTRUMENTATION:
Force measuring capabilities

Pressure measuring capabilities

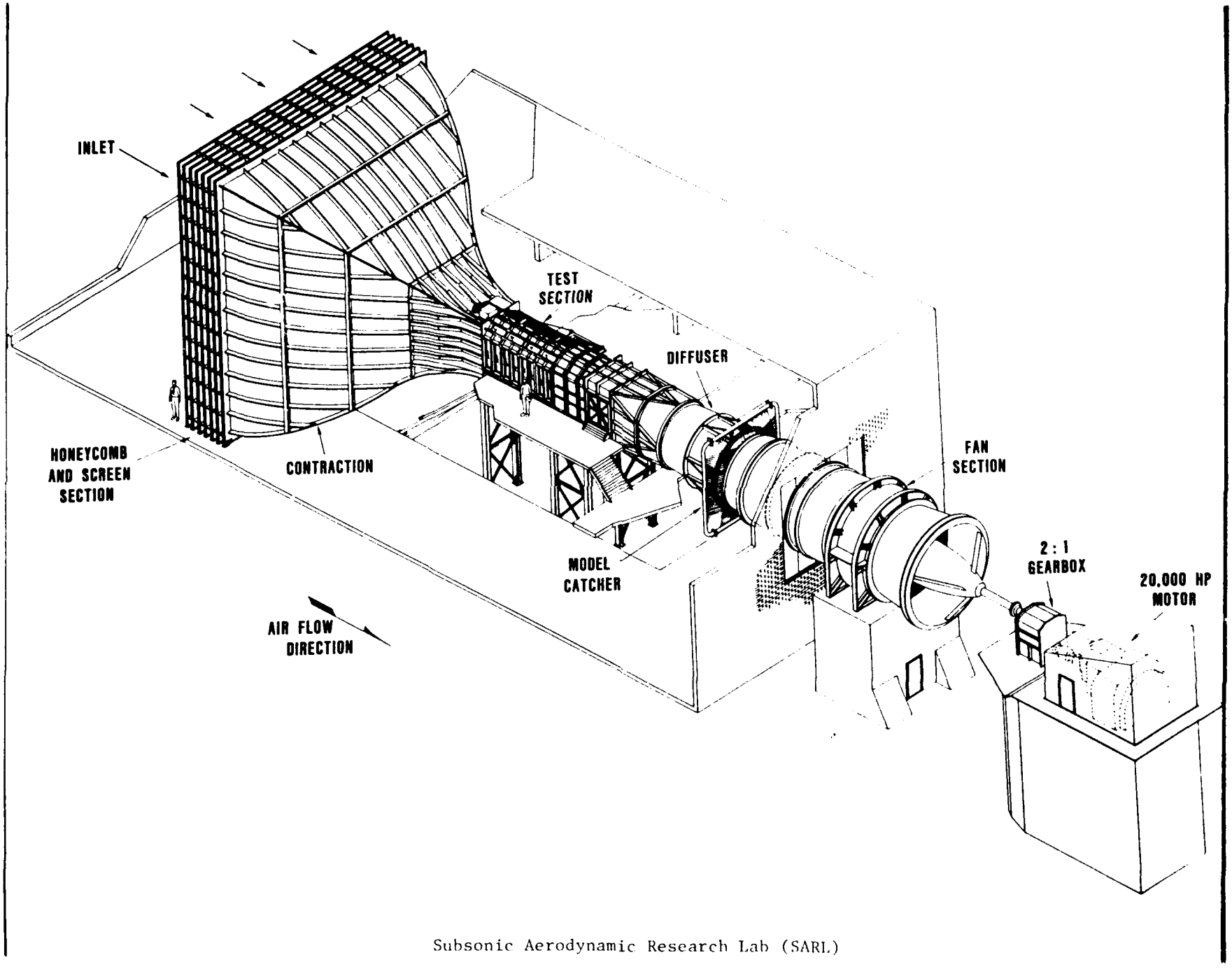
Flow field probing

AVAILABILITY:
Primarily in-house research

Limited U.S. Government agency use, and government contractors

LOCATION:
BUILDING: 25C ROOM:

POINT OF CONTACT:
WRDC/FIMN
WPAFB, OH 45433-6553
(513) 255-2809
AV 785-2809



Subsonic Aerodynamic Research Lab (SARL)

FACILITY TYPE:
Research

PURPOSE:
Investigate induced damage and/or fracture of the micro-scale structures typically used in the design and construction of avionics systems

FACILITY NAME:
Integrated Electronics Environmental Laboratory

PRIMARY CAPABILITIES:
Vibration, thermal cycling and combined environments testing of micro-scale structures typical of modern electronics assemblies

SPECIAL/UNIQUE CAPABILITIES:
Capability to measure the response of micro-scale elements to vibration and/or thermal cycling environmental stresses

INSTRUMENTATION:
Differential laser vibrometer which measures the relative displacements of micro-scale structures with a resolution of 0.5 microns

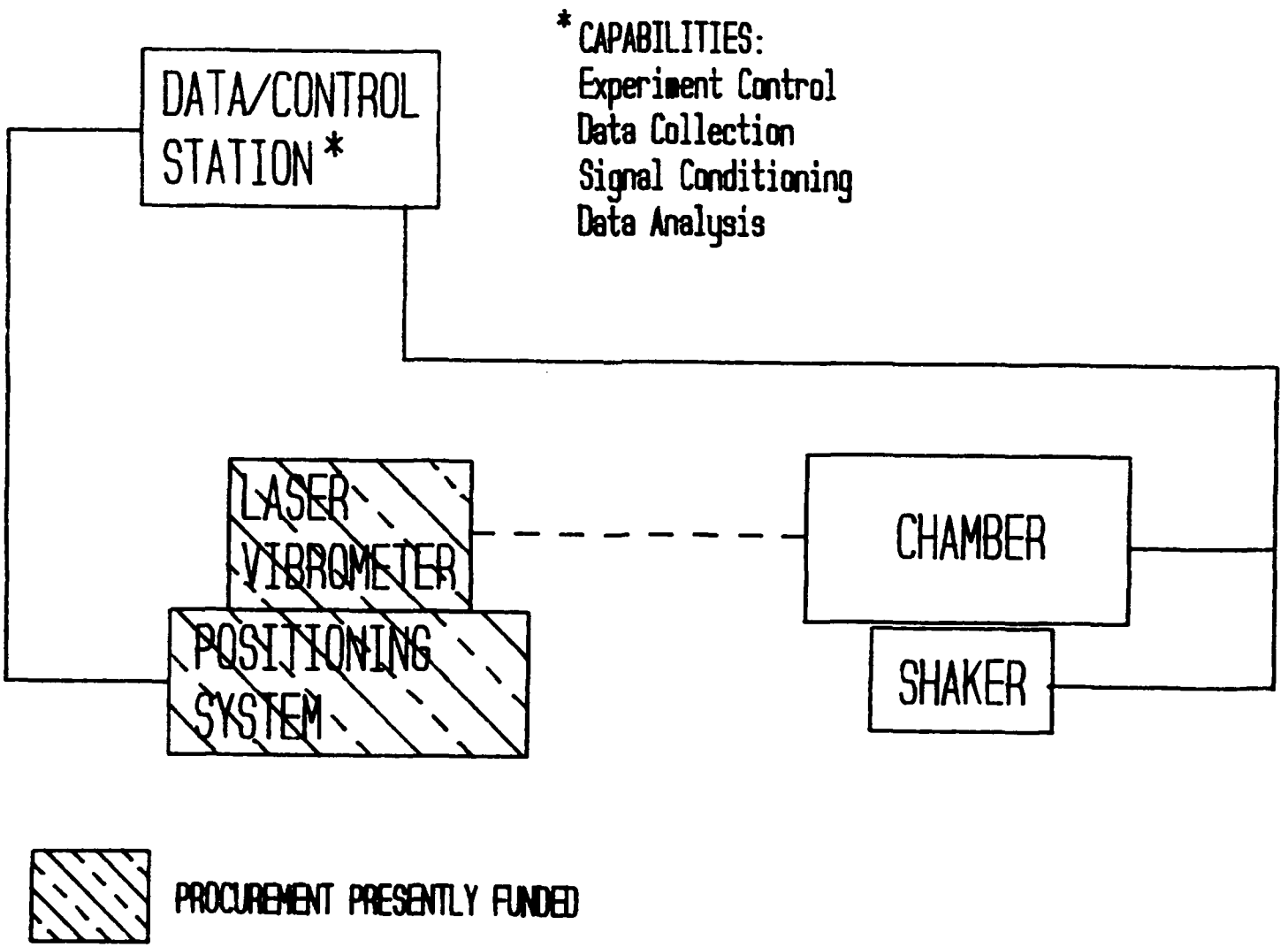
AVAILABILITY:
Primarily in-house research

Limited U.S. Government agency use

LOCATION:
BUILDING: 45 ROOM: Annex

POINT OF CONTACT:
WRDC/FIVE
WPAFB, OH 45433-6553
(513) 255-3021
AV 785-3021

INTEGRATED ELECTRONICS ENVIRONMENTAL TEST LAB



FACILITY TYPE:
Landing Gear

PURPOSE:
Perform functional and qualification tests on landing gear assemblies and component hardware

FACILITY NAME:
DOD Landing Gear Development Facility

PRIMARY CAPABILITIES:
Aircraft tire/wheel testing: 350 mph top speed 150 k-lb max load + 203 yaw and camber

Aircraft brake/wheel/tire testing: 200 mph top speed, 350k - lb max load, 220 M ft lbs max energy

Load tension/compression: 1 M lb tension, 3 M lb compression

SPECIAL/UNIQUE CAPABILITIES:
Only test facility currently capable of simulating runway bomb repairs in testing landing gears

INSTRUMENTATION:
Measurement of all standard parameters associated with landing gear and/or component testing

PDP 11/family computers or standard brush recorders or data logger recorders

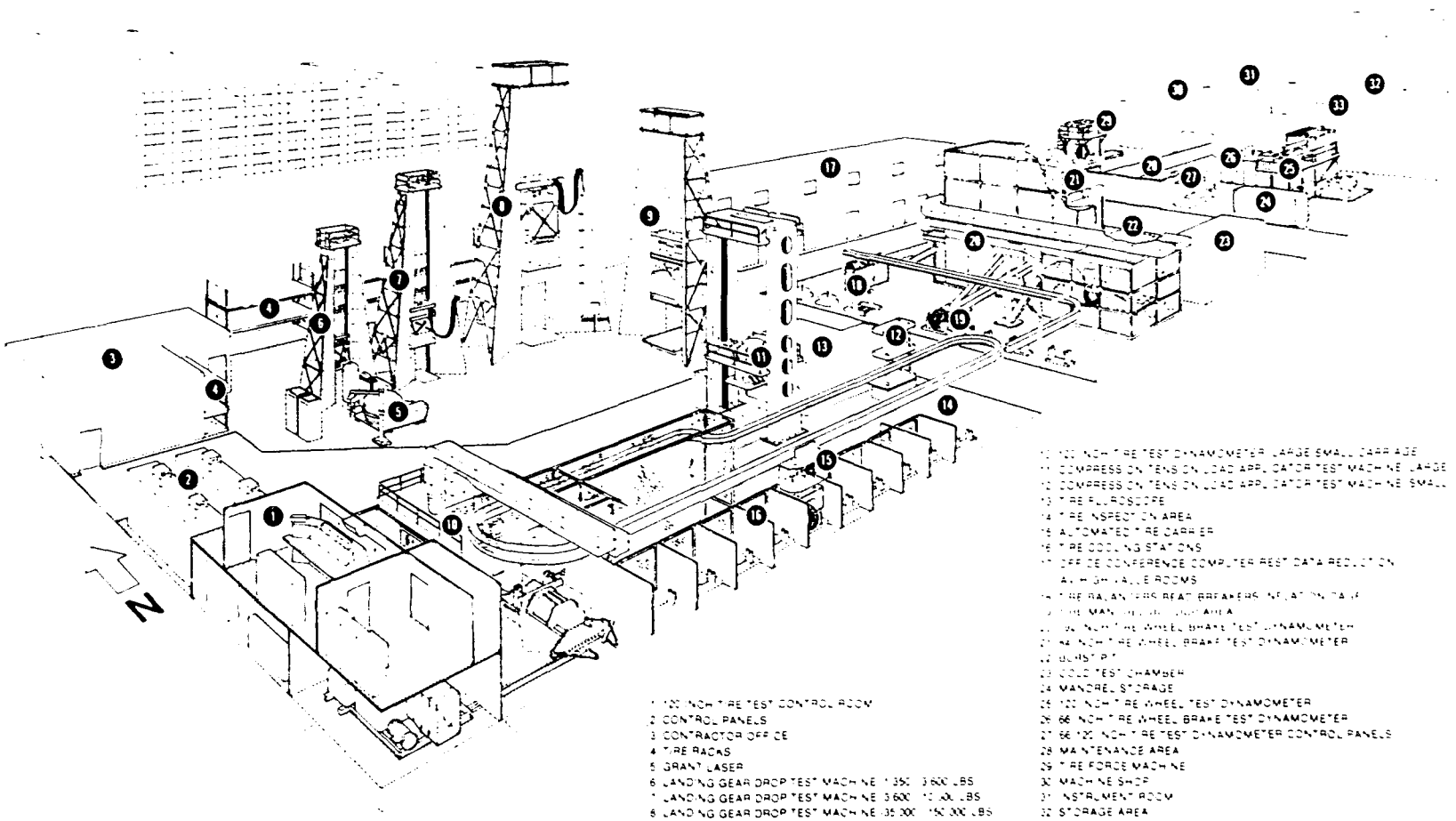
Computer data output can be reformated to any other industry recognized standard format

AVAILABILITY:
Available to U.S. Government agencies and contractors

Available to industry

LOCATION:
BUILDING: 31 ROOM:

POINT OF CONTACT:
WRDC/FIVM
WPAFB, OH 45433-6553
(513) 255-2663
AV 785-2663



1 100 KIP TIRE TEST CONTROL ROOM
2 CONTROL PANELS
3 CONTRACTOR OFFICE
4 TIRE RACKS
5 GRANT LASER
6 LANDING GEAR DROP TEST MACHINE 1 350 - 3 600 LBS
7 LANDING GEAR DROP TEST MACHINE 3 600 - 10 000 LBS
8 LANDING GEAR DROP TEST MACHINE 35 000 - 150 000 LBS
9 DYNAMIC LANDING GEAR LOAD SIMULATOR
10 100 KIP TIRE TEST DYNAMOMETER LARGE SMALL CARRIAGE
11 COMPRESSION TENSION LOAD APPLICATOR TEST MACHINE LARGE
12 COMPRESSION TENSION LOAD APPLICATOR TEST MACHINE SMALL
13 TIRE FLUOROSCOPE
14 TIRE INSPECTION AREA
15 AUTOMATED TIRE CARRIER
16 TIRE COOLING STATIONS
17 OFFICE CONFERENCE COMPUTER TEST DATA REDUCTION
18 TIRE BALANCERS BEAD BREAKERS INFLATION RACK
19 TIRE MAINTENANCE AREA
20 66 KIP TIRE WHEEL BRAKE TEST DYNAMOMETER
21 66 KIP TIRE WHEEL BRAKE TEST DYNAMOMETER
22 BOILER
23 COLD TEST CHAMBER
24 MANDREL STORAGE
25 100 KIP TIRE WHEEL TEST DYNAMOMETER
26 66 KIP TIRE WHEEL BRAKE TEST DYNAMOMETER
27 66 100 KIP TIRE TEST DYNAMOMETER CONTROL PANELS
28 MAINTENANCE AREA
29 TIRE FORCE MACHINE
30 MACHINE SHOP
31 INSTRUMENT ROOM
32 STORAGE AREA
33 GENERATOR COMPRESSOR ROOM

LANDING GEAR TEST FACILITY
WRIGHT-PATTERSON, AFB, OHIO
BUILDING 31

FACILITY TYPE:
Launch and Recovery Subsystems

PURPOSE:
Examine ways of improving existing launch and recovery subsystems through application of latest technological inovations

FACILITY NAME:
Mobility Development Laboratory

PRIMARY CAPABILITIES:
Dynamic Test Machine - whirling arm capable of testing subsystems, mainly landing gear, through all phases of launch and recovery

Static Test Platform - table to hold model and overhead support structure to lift and h9old model during tests

SPECIAL/UNIQUE CAPABILITIES:
Dynamic Test Machine: max model weight - 1000 lbs; speed range - 1 to 70 fps; max acceleration - + 8 fps2

Static Test Platform load capacaity: platform - 7,500 lbs, hoist - 10,000 lbs, winch - 5,000 lbs

INSTRUMENTATION:
20 channel measurement capability

Automatic Data Acquisition and Control System - provides rapid test analysis immediately after test is done

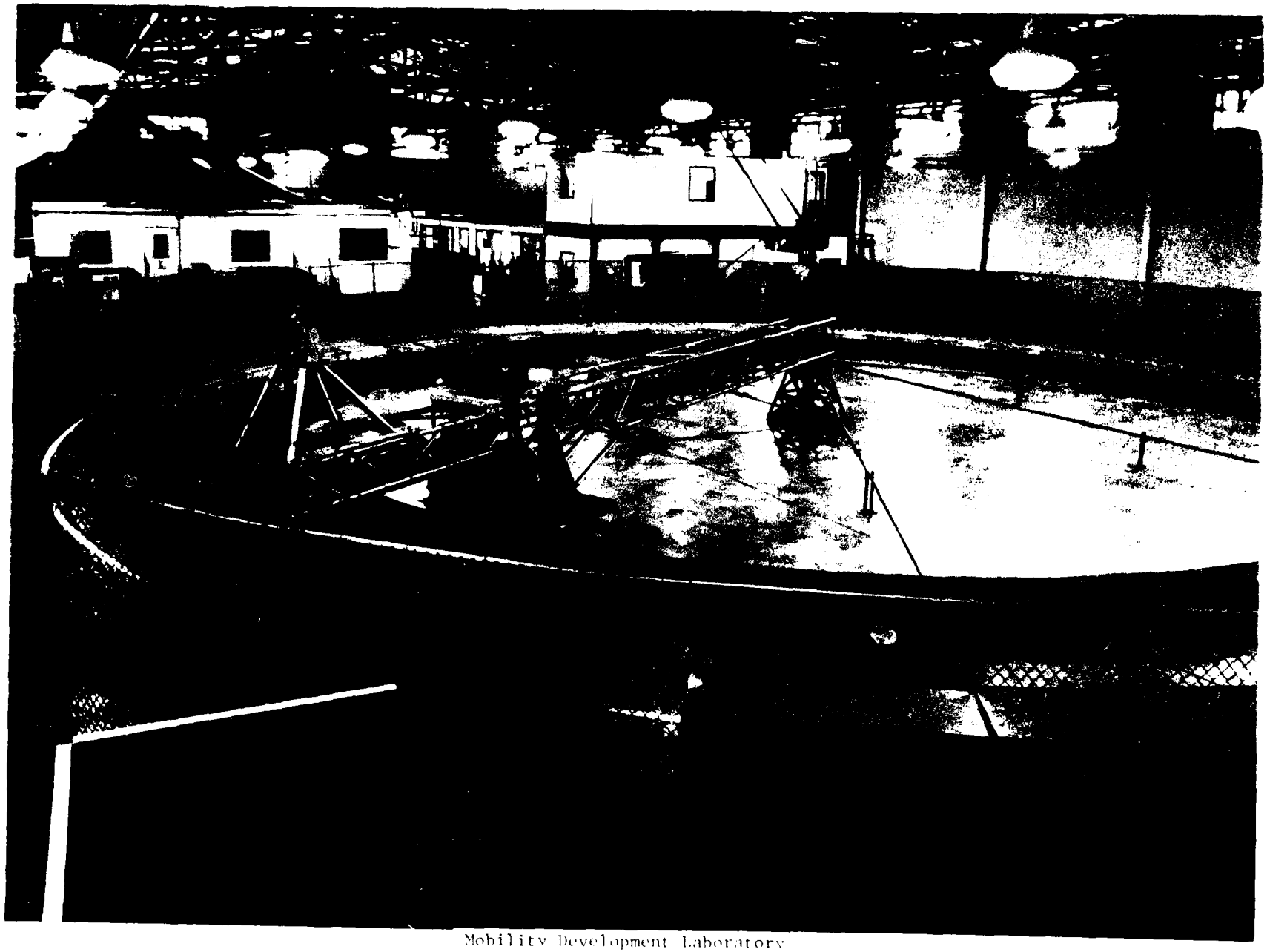
Pressure transducers around model to determine airflow pattern around vehicle

AVAILABILITY:
Primarily in-house research

Available to all DOD agencies and industry contractors

LOCATION:
BUILDING: 255C ROOM:

POINT OF CONTACT:
WRDC/FIVM
WPAFB, OH 45433-6553
(513) 257-2129
AV 787-2129



Mobility Development Laboratory

FACILITY TYPE:
Vulnerability Live Fire Test

PURPOSE:
Support the development of combat survivable systems

FACILITY NAME:
Aircraft Survivability Research Facility

PRIMARY CAPABILITIES:
Range 1 - develop threat simulations and test range instrumentation; evaluate material and component ballistic tolerance

Range 2 - Evaluate fueled and non-fueled vulnerability programs

Range 3 - Study Ballistic vulnerability on full-scale test programs

SPECIAL/UNIQUE CAPABILITIES:
Range 1 - 10 ft x 12 ft x 65 ft (max standoff) indoor range

Range 2 - 26 ft X 24 ft x 27 ft x 100 yards long horizontal outdoor range

Range 3 - 40 ft w x 25 ft d x 39 ft h vertical range; 40 ft w x 25 ft d x 50 ft l horizontal range

INSTRUMENTATION:
Range 1 - Manual or fully automated solid state electronics with computer sequencing

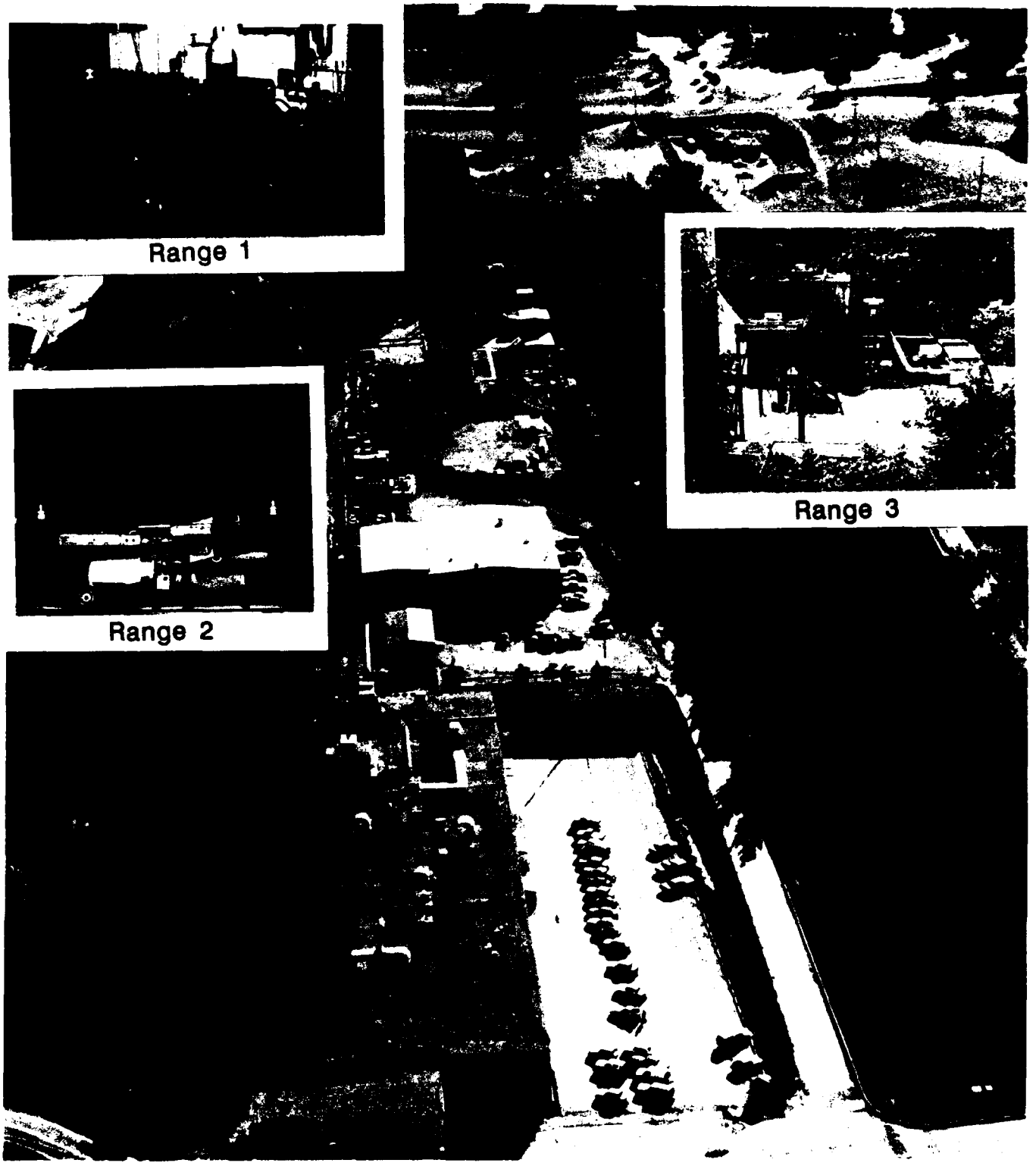
Ranges 2 and 3 - Manual or fully automated with computer sequencing

AVAILABILITY:
Available to all U.S. Government agencies

Limited availability to industry

LOCATION:
BUILDING: 191B ROOM:

POINT OF CONTACT:
WRDC/FIVS
WPAFB, OH 45433-6553
(513) 255-6302
AV 785-6302



AIRCRAFT SURVIVABILITY RESEARCH FACILITY

COCKPIT INTEGRATION DIRECTORATE

FACILITY TYPE:
Crew Systems Integration

PURPOSE:
Three dimensional cockpit displays

FACILITY NAME:
Laser Optics Laboratory (LOL)

PRIMARY CAPABILITIES:
Display optical holography

Real time holographic material/device evaluation

Computational holography; holographic optical elements

Laser display technology development

SPECIAL/UNIQUE CAPABILITIES:
Optical bench system (enclosed)

Class IV laser facility

Facility located within Tempest area

INSTRUMENTATION:
Variety of IIIb lasers (HeNe's, HeCd, Ar-ion)

Spatial light modulator (Hughes LCLV), MicroVAX II, Elixi, 386 PC, Sun workstations

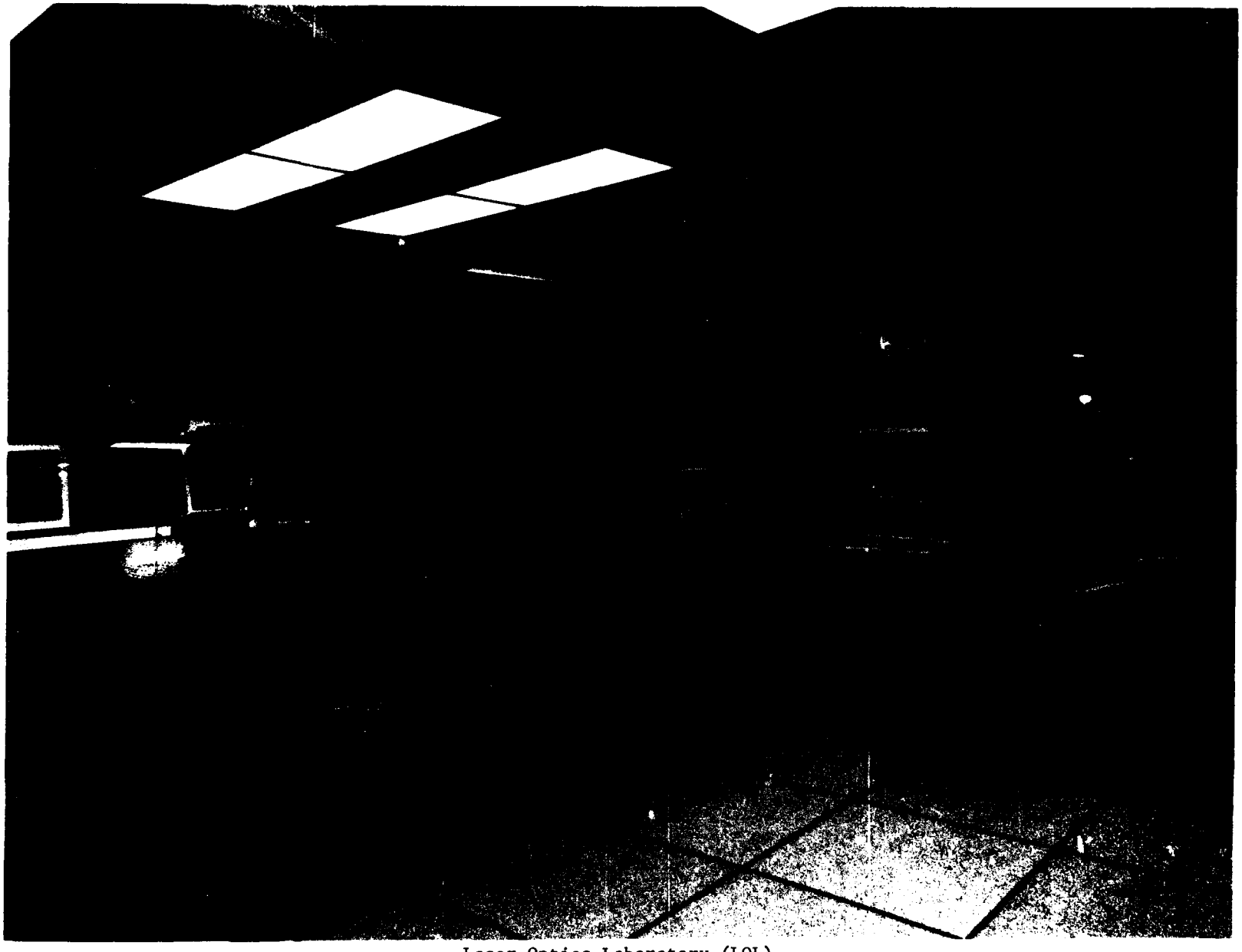
Image digitization camera (Eikonix)

AVAILABILITY:
Available to U.S. Government agencies

Some industry availability

LOCATION:
BUILDING: 146 ROOM: 114

POINT OF CONTACT:
WRDC/KTD
WPAFB, OH 45433-6553
(513) 255-8258
AV 785-8258



Laser Optics Laboratory (LOL)

FACILITY TYPE:
Crew Systems Integration

PURPOSE:

FACILITY NAME:
Microprocessor Applications of Graphics and Interactive Communication (MAGIC)

PRIMARY CAPABILITIES:
Aid in future cockpit design

Evaluate advanced technologies for cockpit use

Evaluate pilot - vehicle interface concepts

SPECIAL/UNIQUE CAPABILITIES:
Computer generated steroscopic three dimension (3D) displays; generic voice input/output capability

Programmable display switches; touch-sensitive overlays on display monitors

Voice octivation of cockpit systems; new HUD Symbology for Unusual Attitude Recovery

INSTRUMENTATION:
Compaq 386/20e computers with 387 math

Silicon graphics IRIS 3130 workstation

Ethernet communication network

AVAILABILITY:
Available to U.S. Government agencies

LOCATION:
BUILDING: 146 *ROOM:* 114

POINT OF CONTACT:
WRDC/KTC
WPAFB, OH 45433-6553
(513) 255-8210
AV 785-8255

FACILITY TYPE:
Crew Station Design

PURPOSE:
Conduct advanced transport crew station control/display evaluations

FACILITY NAME:
Transport Aircraft Cockpit (TRAC)

PRIMARY CAPABILITIES:
Support evaluation of advanced transportation crew station designs through part and full mission simulation studies

Dynamic mockup

Initial operating capability scheduled for FY91

SPECIAL/UNIQUE CAPABILITIES:
Rapid prototyping of advanced control/display concepts

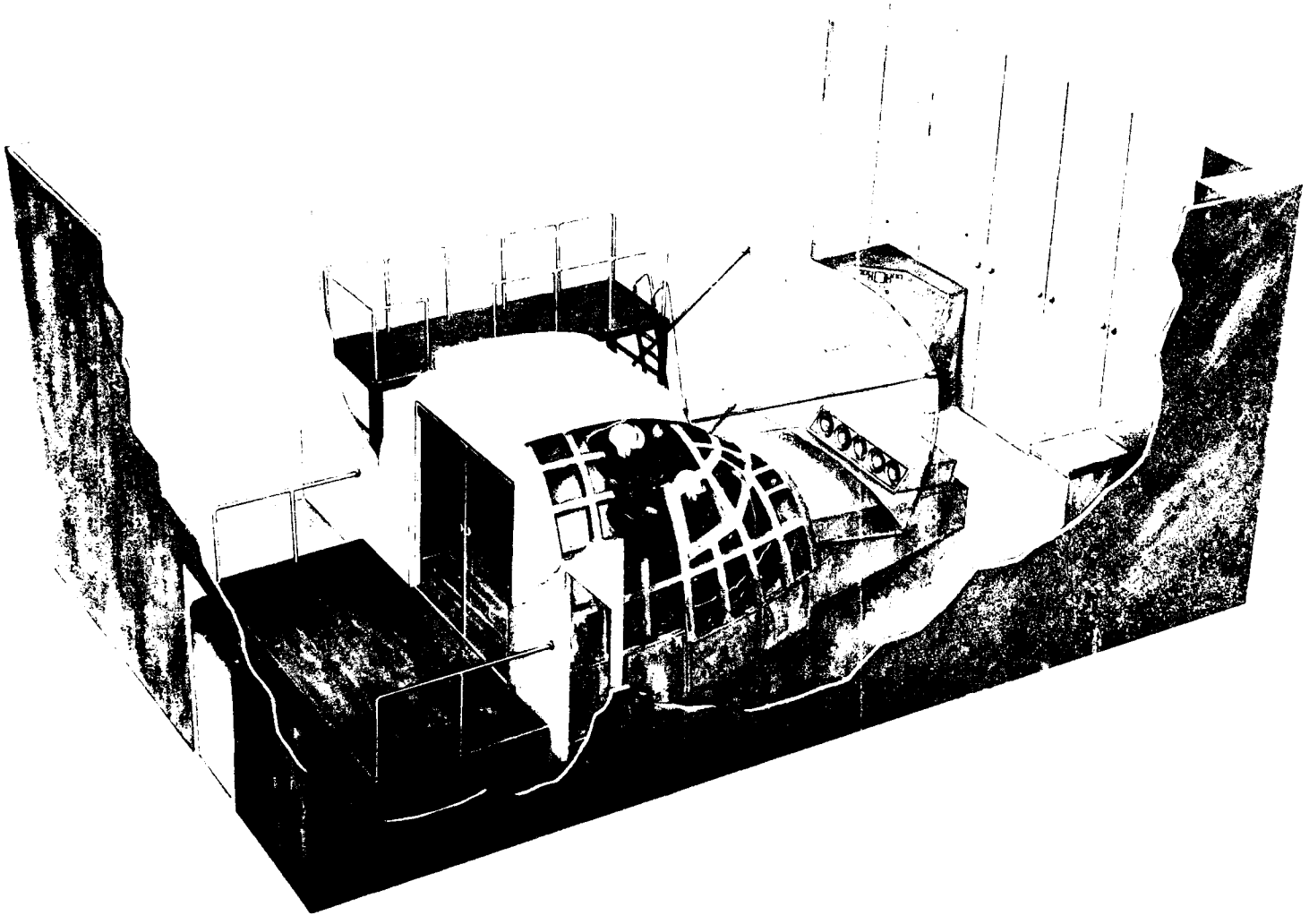
INSTRUMENTATION:
IRIS 4D graphics workstations networked to an ELXSI computer

AVAILABILITY:
Primarily in-house research

Available to U.S. Government agencies and contractors

LOCATION:
BUILDING: 146 ROOM: 114

POINT OF CONTACT:
WRDC/KTC
WPAFB, OH 45433-6553
(513) 255-6696
AV 785-6696



Transport Aircraft Cockpit (TRAC)

SIGNATURE TECHNOLOGY DIRECTORATE

FACILITY TYPE:
Radar Cross Section

PURPOSE:
Development of radar cross section reduction technologies

FACILITY NAME:
Compact Radar Cross Section (RCS) Range

PRIMARY CAPABILITIES:
Pulse-gated broadband, 2 to 18 GHz with 10 mHz increments, frequency sweeps

Single frecuency azimuth measurements

Five feet target quiet zone

Target pedestal rated to support a 500 pound target

SPECIAL/UNIQUE CAPABILITIES:
Downrange imaging capability

Capability to measure small targets with accuracy

INSTRUMENTATION:
Coherent data acquisition system to measure amplitude and phase at each frequency increment

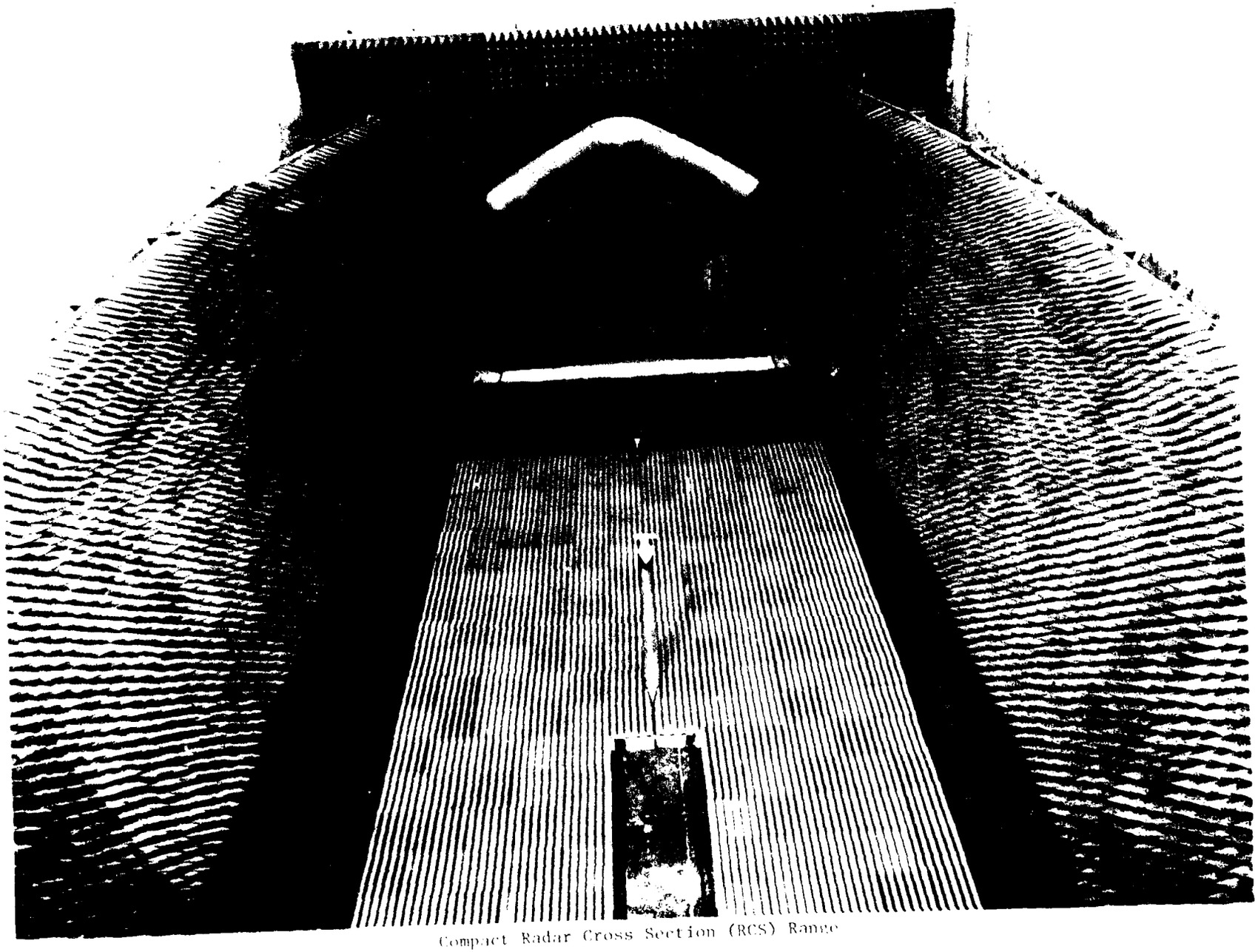
Automated data acquisition/reduction

AVAILABILITY:
Primarily in-house research

Limited use by Government contractors

LOCATION:
BUILDING: 821 ROOM:

POINT OF CONTACT:
WRDC/SNA
WPAFB, OH 45433-6523
(513) 255-5076
AV 785-5076



Compact Radar Cross Section (RCS) Range

FACILITY TYPE:
Radar Cross Section

PURPOSE:
Monostatic/bistatic far field radar cross section measurements

FACILITY NAME:
Far Field Range (FFR)

PRIMARY CAPABILITIES:
Radar cross section (RCS) measurements, 2 to 18 GHz Continuous Wave, as a funcion of azimuth angle

Pulse-gated broadband coherent RCS measurements, 2 to 18 GHz with 10 MHz steps

SPECIAL/UNIQUE CAPABILITIES:
Pulse-gated broadband measurements; continuous wave measurements

Bistatic measurements, 0 to 160 deg

Development of advanced measurement techniques/instrumentation

INSTRUMENTATION:
Radio frequency energy synthesized by two HP 8340 synthesized sweepers

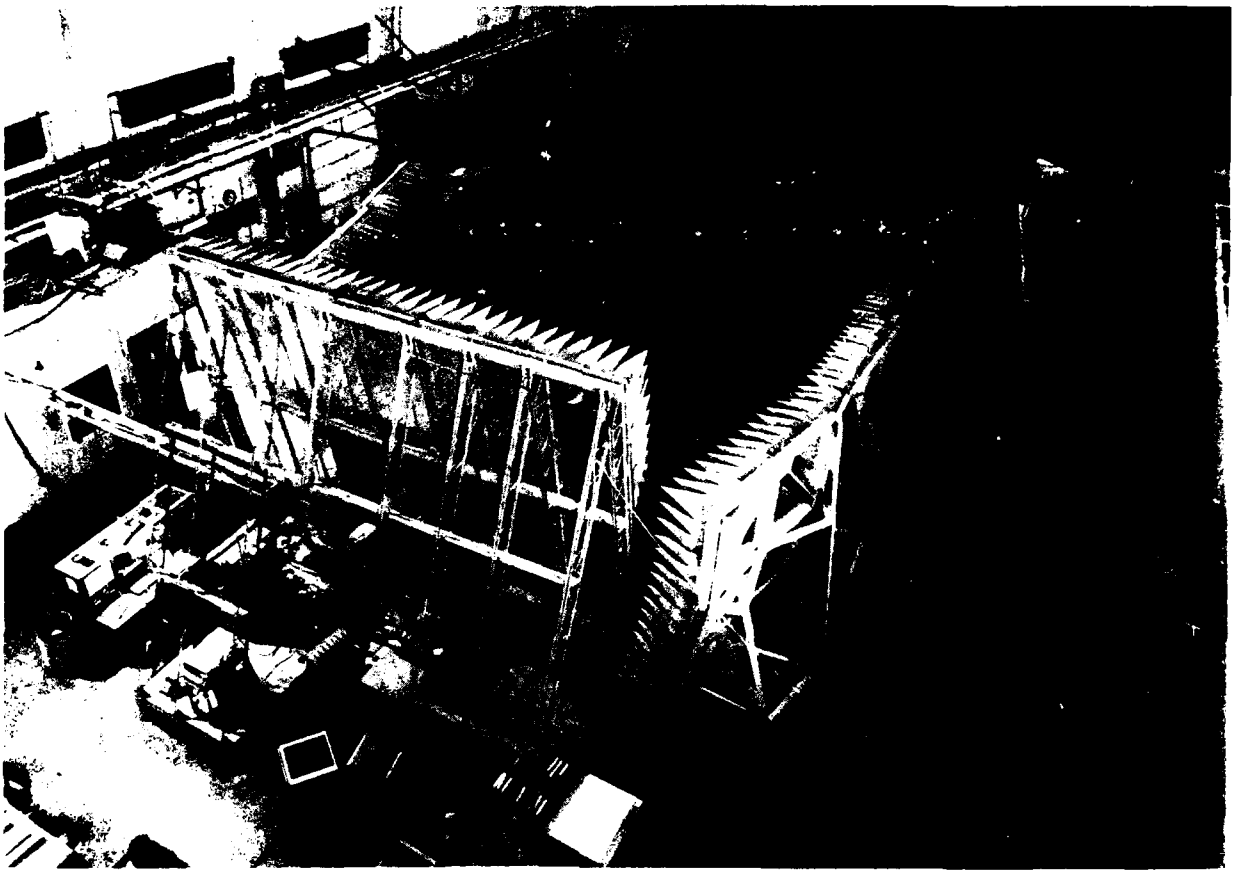
Lintek Pulse Generator controls radio frequency switches; scattered radio frequency energy received by a Scientific Atlanta 1780 series receiver

All above devices controlled by an EVEREX/286 PC

AVAILABILITY:
Primarily in-house research

LOCATION:
BUILDING: 821 ROOM:

POINT OF CONTACT:
WRDC/SNA
WPAFB, OH 45433-6523
(513) 255-5076
AV 785-5076



[illegible] Field Press (FBR)

FACILITY TYPE:
RF/EO Materials Measurements

PURPOSE:
RF/EO characterization of electromagnetic properties of signature control materials

FACILITY NAME:
Materials Measurements Facility

PRIMARY CAPABILITIES:
Measurements of electrical properties of small donut sample or rectangular sample

Measurements from 45 MHz to 26.5 GHz

SPECIAL/UNIQUE CAPABILITIES:
Make mu and epsilon measurements

INSTRUMENTATION:
HP 8510A and HP 8510B

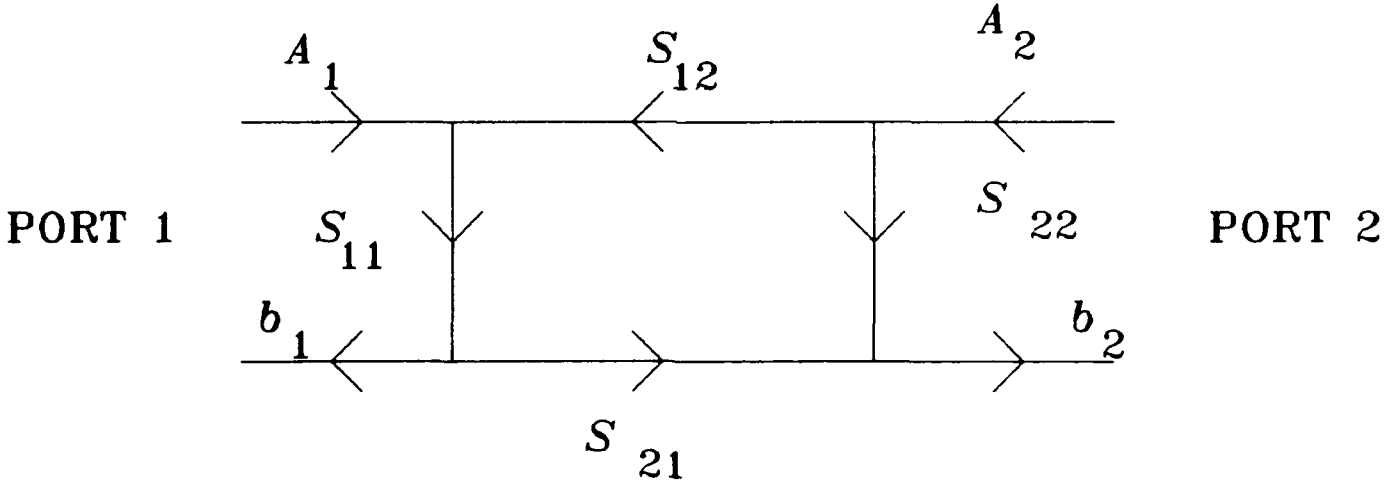
AVAILABILITY:
Primarily in-house research

LOCATION:
BUILDING: 821 ROOM:

POINT OF CONTACT:
WRDC/SNA
WPAFB, OH 45433-6523
(513) 255-5076
AV 785-5076

FREQUENCY DOMAIN MATERIAL MEASUREMENTS

AUTOMATED NETWORK ANALYZER



MATERIALS MEASUREMENT FACILITY

FACILITY TYPE:
Laser Radar Cross Section

PURPOSE:
Development and evaluation of laser radar signature reduction technologies

FACILITY NAME:
Indoor Laser Cross Section (LCS) Range

PRIMARY CAPABILITIES:
Makes pulsegated laser reflection measurements while rotating a target through 360 degrees

Laser radar cross section measurements on model aircraft

Monostatic laser reflectance of paints/coatings

Signature of aircraft components/sub assemblies

SPECIAL/UNIQUE CAPABILITIES:
Allows LCS measurement of targets up to three feet long and weighing less than 500 pounds

Turntable can be rotated from 0 to 1/3 RPM in either direction with 0.1 degree accuracy

Maximum distance from source to target is 50 feet; automated data collection/reduction

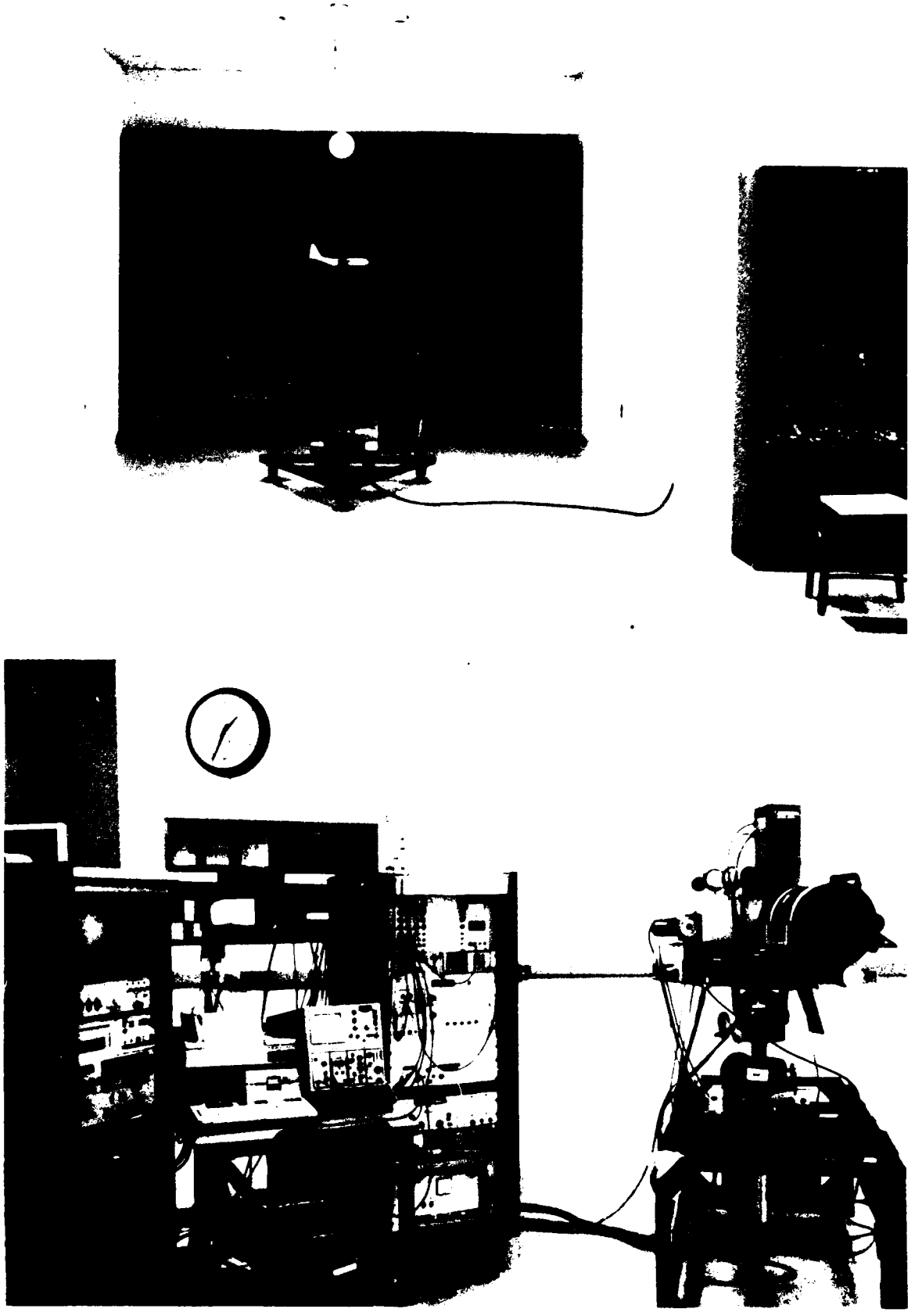
INSTRUMENTATION:
Multiple laser wavelengths are used including 0.532, 0.86, 1.064, and 10.6 micrometers

AVAILABILITY:
Primarily in-house research

Limited use by Government contractors

LOCATION:
BUILDING: 254 ROOM:

POINT OF CONTACT:
WRDC/SNS
WPAFB, OH 45433-6523
(513) 255-9333
AV 785-9333



Indoor Laser Cross Section (LCS) Range

FACILITY TYPE:
Laser Radar Cross Section

PURPOSE:
Development and evaluation of laser cross section technologies on operational vehicles

FACILITY NAME:
Outdoor Laser Cross Section (LCS) Range

PRIMARY CAPABILITIES:
Laser radar cross section measurements on operational aircraft

Laser reflection measurements on large components/sub assemblies

SPECIAL/UNIQUE CAPABILITIES:
Turntable: 60 ft by 20 ft load bearing area capable of supporting 110,000 pounds; rotates from 0 to 1/3 RPM in either direction with 0.1 degree accuracy

Size and weight limits of turntable allow measurement of aircraft up to and including a C-130

INSTRUMENTATION:
Instrumentation van may be placed 1000, 2000, or 3000 feet from turntable

Multiple laser wavelengths used, including 0.532, 0.85, 1.064, and 10.6 micrometers

Located on southwest end of taxiway 8, Area C

AVAILABILITY:
Primarily in-house research

Limited use by Government contractors

LOCATION:
BUILDING: ROOM:

POINT OF CONTACT:
WRDC/SNS
WPAFB, OH 45433-6523
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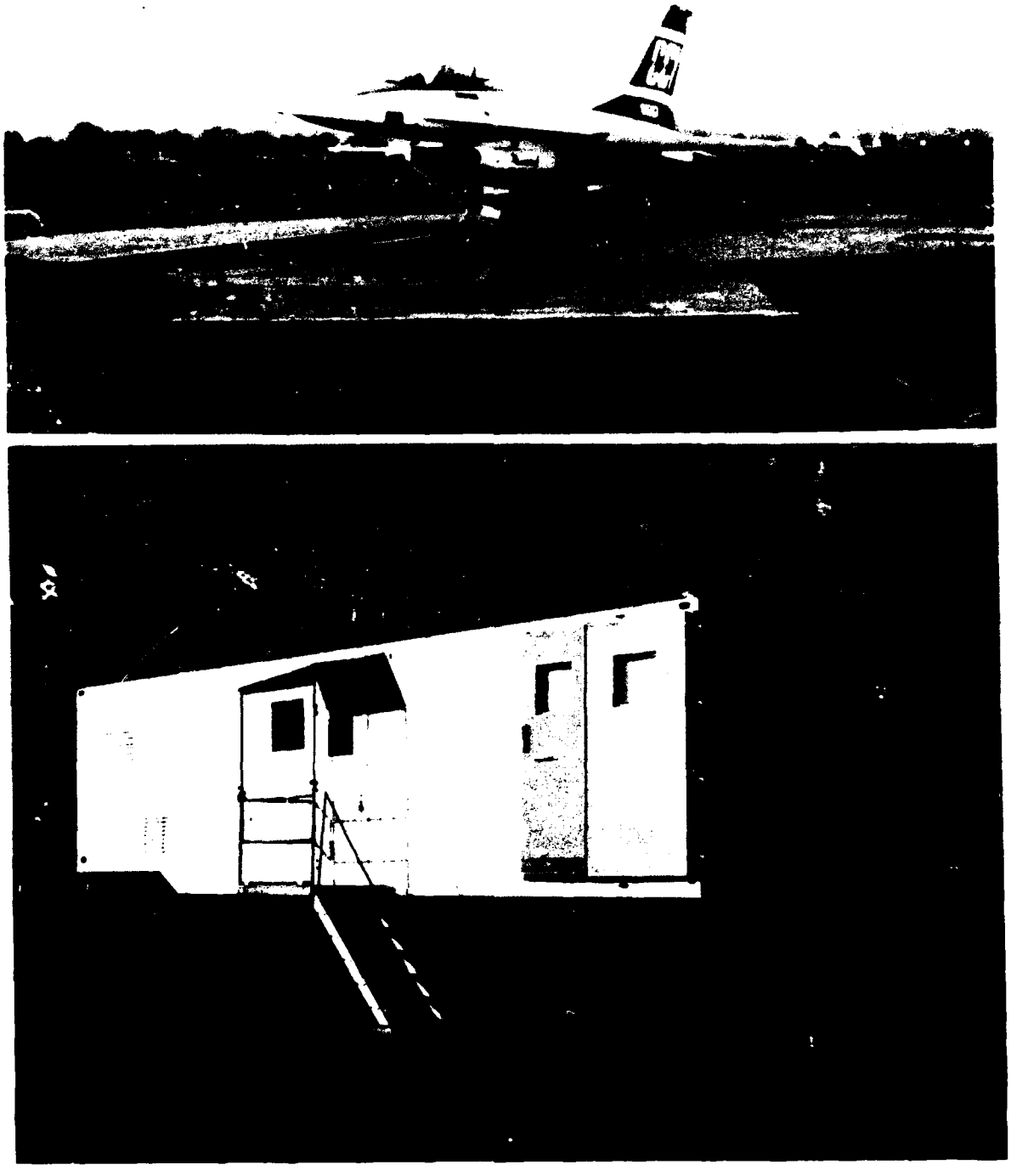
AV 785-9333



Outdoor Laser Cross Section (LCS) Range

TECHNOLOGY EXPLOITATION DIRECTORATE

FACILITY TYPE:
Artificial Intelligence (AI)

PURPOSE:
Artificial intelligence research and development with emphasis on near-term transition and application of AI technologies

FACILITY NAME:
Artificial Intelligence Technology Laboratory

PRIMARY CAPABILITIES:
Evaluate and prototype applications of AI technology

Provide AI education and training

Evaluate AI-related hardware and software

SPECIAL/UNIQUE CAPABILITIES:
AI Technology Office (AITO), bldg 22: Vaxstation 3s, Sun 3/60, Symbolics 3650, Z-248s with AI Architect 80386 Hummingboards,Macintosh II, laser printers

Dayton Center for AI Application (CAIA), Miami Valley Research Park: computing facilities distributed throughout a consortium of five local universities

INSTRUMENTATION:
None

AVAILABILITY:
AITO: Available to U.S. Government agencies

CAIA: Available to U.S.Government agencies and industry

LOCATION:
BUILDING: 22 ROOM: S108

POINT OF CONTACT:
WRDC/TXI
WPAFB, OH 45433-6523
(513) 255-5800
AV 785-5800

ARTIFICIAL INTELLIGENCE TECHNOLOGY OFFICE
COMPUTING FACILITIES

MicroVax Workstations and
Zenith Z-248s with 80386 add-in processor
and 80287 math coprocessor

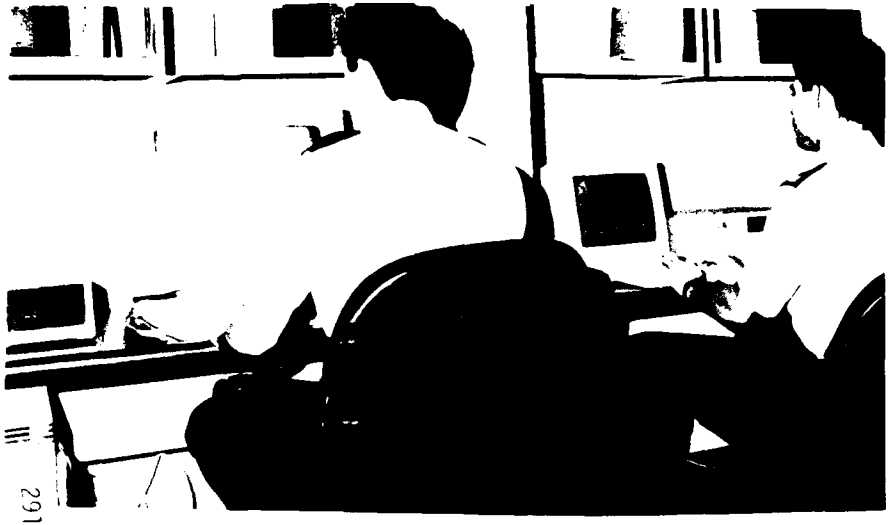
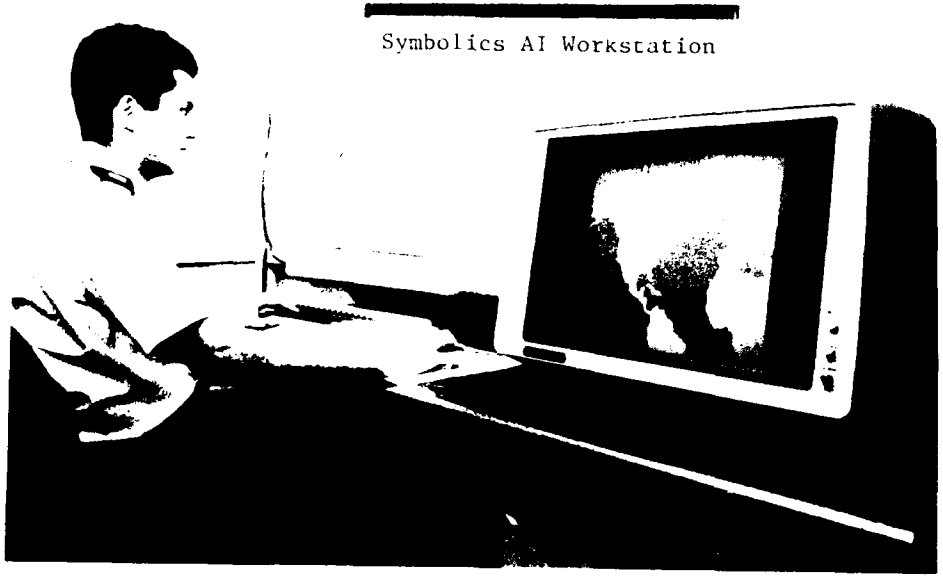


Image Capture, Processing,
and Display

Symbolics AI Workstation



Sun AI Workstation

FACILITY TYPE:
Air combat simulation/analysis

PURPOSE:
Simulation/analysis of aircraft weapon systems; initial emphasis on air-to-air combat; air to ground combat analysis capability planned

FACILITY NAME:
Air Combat Effectiveness Research System (ACER)

PRIMARY CAPABILITIES:
1 on 1 through M on N air combat analysis; models primary aircraft weapon system characteristics

Allows both digital batch and Man-in-the-Loop simulations

Aircraft can be controlled either by the machine (digitally) or by a human operator within the same analysis run

SPECIAL/UNIQUE CAPABILITIES:
Mixture of computer systems and support hardware

Linkage to aircraft design system enhances the performance evaluation/redesign cycle

INSTRUMENTATION:
None

AVAILABILITY:
Available to all US Government agencies

LOCATION:
BUILDING: 450 ROOM: Vault

POINT OF CONTACT:
WRDC/TXAA
WPAFB, OH 45433-6523
(513) 255-5880
AV 785-5880

REMODELING IN PROGRESS

NO PHOTOS AVAILABLE

NEW FACILITY OPERATIONAL IN APRIL 1990

FACILITY NAME INDEX

KEY WORD INDEX

U.S. Government Printing Office: 1990 — 748-003/00405